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EXPERIMENT STATION RECORD

VOLUME XXVI, 1912

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EXPERIMENT STATION RECORD.

VOL. XXVI. JANUARY, 1912. No. 1.

Columbus, Ohio, was the mecca of a considerable number of societies for agricultural science and education in the middle of last November, and the meetings held there, covering a period of about a week, resembled a live and comprehensive congress of agriculture.

Beginning with the annual meeting of the Association of Farmers' Institute Workers, which started November 13, the gathering included meetings of the American Societies of Agronomy and of Animal Nutrition, the Society for the Promotion of Agricultural Science, the American Farm Management Association, the new American Association for the Advancement of Agricultural Teaching, the Association of Official Seed Analysts, and the Association of Feed Control Officials, concluding with the annual convention of the Association of American Agricultural Colleges and Experiment Stations. The National Grange and the Ohio State Grange were also in session in the city during the week.

Such a gathering well illustrates the present organization of agricultural science and education, and shows the remarkable activity in this respect since the first convention of the agricultural colleges and experiment stations less than 25 years ago. The above list by no means embraces all the present-day societies devoted to the promotion of agricultural science. To the list might be added the Society for Horticultural Science, the Association of Economic Entomologists, of Dairy Instructors, and of Horticultural Inspectors, as well as the Official Agricultural Chemists, the Society of Agricultural Engineers, and the American Breeders' Association. These all exist as independent organizations, with no affiliation or means of exchange with each other, and with little knowledge of one another's activities or means of keeping posted. Many of them are comparatively new, several are small in numbers, but each has taken to itself a special field and is doing active and energetic work.

In addition to this development of special societies, many of the scientific societies, in whose programs papers bearing on agriculture rather than the primary sciences would hardly have been looked for a few years ago, are now giving prominence to discussions of soil fertility, crop production, plant improvement, and methods of investigation bearing on typical agricultural questions. This was, perhaps, never more marked than at the meeting of the American As-

sociation for the Advancement of Science in December. It may be noted also that an amendment to the constitution of the association was submitted to the council, providing for the addition of a section on agriculture, the proposal to be acted upon at the meeting next year. While this is interesting as pointing to the increased attention which the subject of agriculture is attracting from men of science, and a recognition of the position which it has attained, agriculture as a composite science is already receiving much attention in the various science sections of the association, and it is perhaps questionable whether the attempt to take these discussions out of their present setting and transfer them to a single section would be successful in any large measure.

Agriculture has long suffered from a dissipation or division of effort, and to a certain extent has been subject to too narrow or one-sided specialization. The publication of the scientific work relating to it has been scattered through the proceedings of many scientific and semipopular bodies, and there has been no agency for assembling this material so as to give an adequate expression of its volume and scientific character. The result has had its effect to some extent upon the men working in it, and on the general conception of scientific men in regard to it. From an almost entire lack of suitable place for papers and discussions in this field, there has come to be such a multiplicity of societies and associations, each usually dedicated to a rather narrow field and working quite independently of any other organization, often with duplication or overlapping, that confusion and a lack of strength and effectiveness have resulted. With the largest working body of agricultural scientists in any country in the world, we have more organization and less union than is to be found anywhere else. An attempt to bring into closer affiliation the work of various agencies for agricultural science is believed by many to be desirable, and the best means of effecting this to the greatest advantage of the science and the workers engaged in it is the question under consideration.

It is natural that many scientific workers should wish to maintain an affiliation with a society devoted to the branch of basic science in which they are primarily interested. Here the progress of the science in its more abstract form and its applications in various lines naturally appeals to the broader interest of the man. But he may also wish to meet with men who are considering more specifically the direct applications of science to the various phases of agricultural problems. In the latter, conditions which preserve a breadth of vision may well be provided, in order to avoid too narrow consideration from confining association to a coterie of workers who are viewing questions from a rather narrow angle, and hence likely to lose sight of other factors. Most questions and problems in this in-

dustry are quite complex and need to be approached from several points of view and to have an unusual variety of conditions taken into account. Again, workers who are inclined to view these subjects primarily in their practical aspects need to touch elbows with men of scientific thought and get inspiration and a broader conception of their field as investigators or teachers. Both classes are benefited by this contact.

But if the number of societies is multiplied and the field too narrowly divided, the advantage which comes from numbers and from broader association is diminished in some measure, the expense of membership is increased, and the difficulty of attending meetings becomes a greater problem. Furthermore, the scattering of effort and of the results of discussion leads to a weakening of efficiency and of the general impression which is made.

It is interesting to note that progress was made at the Columbus meetings in the formation of an affiliation of societies for the advancement of agricultural science. Five societies took favorable action on the plan drawn up a year ago and appointed delegates to represent them on the council of the affiliation. Just what may be accomplished under the present plan remains to be seen, as the details have yet to be worked out, but the way is at least opened for a closer union of these independent societies and for correlating their efforts and systematizing their programs, so as to avoid some of the present confusion. There is also opportunity for the reduction of expense and possibly for providing means of publication.

Meanwhile an illustration of practical affiliation was furnished at the Columbus gatherings by the arrangement of three joint sessions, at which topics of mutual interest to the societies were discussed. The first of these was a joint meeting of the Society for the Promotion of Agricultural Science and the American Society of Agronomy for the presentation of the two presidential addresses. Other societies had adjusted their programs so that their members were free to attend this session, and by making these addresses a special order not only a larger audience was secured, but an added dignity and importance was lent to the occasion. The knowledge that the presidential addresses would be read to an audience made up from a number of societies would naturally be borne in mind by the writers and a subject of fairly broad interest selected for presentation. This, fortunately, was the case at Columbus, the two addresses dealing with governmental promotion of agricultural science, and the status and future of American agronomy, respectively.

Two symposiums were held which were participated in by the Societies for the Promotion of Agricultural Science, of Agronomy, and of Animal Nutrition, and the American Farm Management

Association. The first of these was on the general topic of the improvement of methods of agricultural investigation, with speakers from the different societies who presented the subject from various points of view; and the second on the live topic of farm management, what it is, and what will be its contribution to agriculture.

These joint meetings were a marked success and met with very general approval. They constituted a new feature in these gatherings. The papers and addresses were excellent, and were to a large extent of interest to the various societies. They were reported by a stenographer, which has not hitherto been the case at the independent sessions of the societies, and hence they are available for publication. The nature of the occasion may have led to special care in their preparation, but at all events they are well worthy of preservation and comprise too valuable a group of discussions to be dissipated.

The arrangements in this case were quite informal and were the result of voluntary, and in a measure unauthorized, action on the part of the secretaries of the societies, but another year the council of the affiliation will supply an agency through which plans and arrangements may be made, and may thus be expected to result in some improvements.

It is the belief of many that this union, if it can be properly developed and extended, will strengthen the societies as a whole and may do much for the position of agricultural science in this country.

A highly important subject considered by the section on experiment station work, and one which has not previously been on the program of the Association of American Agricultural Colleges and Experiment Stations, related to the ethics of experiment station work. This was treated under three heads: (1) As between institutions, (2) as between the institution and the individual, and (3) as between individuals.

In discussing the ethics of station work as between institutions, President Waters emphasized especially the importance of honesty and fairness in the institution as well as the individual engaged in research work, but expressed the belief that, on the whole, American research institutions were singularly free from cause for criticism on this account. He pointed, however, to a number of matters in which the code of ethics was not always fully observed.

The transfer of projects and results of investigation from one institution to another without mutual agreement, or the publication of the results without full credit to the sources from which they were obtained, was strongly condemned. "It should be well understood by all station officers that the results of any research conducted by any officer of a station under any circumstances, so long as these researches have been conducted on station time, with station appa-

ratus or equipment and with station funds, are the sole and exclusive property of the station." On the other hand, officers severing their connection with a station and leaving behind unpublished work should be assured of full credit when the work is published by the station.

The lack of care in the citation of references in American scientific publications was deplored, as was competition in the same lines of work, resulting in many cases in "bidding" for men and unnecessary and wasteful duplication. While duplication of work within reasonable limits was held to be commendable, cases were cited which, in the speaker's opinion, could scarcely be called duplication, but rather "a deliberate attempt on the part of one station to enjoy the benefits of the ingenuity of another."

President Waters favored "the utmost freedom and frankness between station officials, not only within the institution but between the officials of different institutions. There should be no occasion for an investigator withholding from his colleague in another station information regarding what he is doing, what his plans for the future are, and what results he thus far has attained," but this information should be considered strictly confidential and under no circumstances be made improper use of.

In the speaker's opinion, too large salaries are now being paid for young men fresh from college, and there is too much shifting from one institution to another. This is a matter to which speakers in other sessions of the convention called attention. As a remedy for the present indiscriminate and reprehensible "bidding" for men to recruit the station force, the fixing of "a maximum beginning salary and a somewhat uniform maximum rate of promotion" was recommended.

In discussing the ethics of station work as between the institution and the individual, Director R. W. Thatcher maintained that, while "the very atmosphere of these research stations ought to be conducive to high moral standards, and the principles of common honesty and of fair play ought to find here their highest exemplification," there still exists a disposition in some cases to adopt different standards for official and private conduct.

Considering the "institution" as the employer and the "individual" as the employee, the speaker proceeded on the assumption that the institution "has the right to create a position, to define its duties and limitations, and to offer a salary or stipend for the work." On the other hand, "it is obviously the right of the individual to have a clear, thorough, and comprehensive statement of the duties and the limitations of the position before he accepts it." Failure of executives of experiment stations to supply this definite information

at the beginning may account in many cases for subsequent misunderstandings and embarrassments.

An attempt was made to apply the rules which should govern the relations of employer and employee in such specific problems of station ethics as the use of station facilities and supplies for personal profit or pleasure, the obligation of the station worker to keep adequate records of his work which will always be available for station use, and the station's property rights in all of the results of research. This is a highly important matter upon which there has been a surprising amount of laxity. The speaker held that "the individual is not only morally bound to make such records, but ought to be punished if he takes them away from their proper owners." Moreover, in absence of any agreement to the contrary, "these results, so long as they are unpublished, are the exclusive property of the institution and can not be used by the individual to his own advantage in any way without its consent."

As to the obligation resting upon a station worker who is afforded special opportunities which increase his efficiency as an investigator at a station's expense, Prof. Thatcher held that he "is ethically, and should be legally, bound to remain at the institution until it receives such return for its assistance in services of increased efficiency as it shall deem proper. In justice to both the institution and the individual the extent of this additional service should be clearly understood before the obligation is undertaken and the advantage enjoyed," but "increased efficiency, however acquired, should receive increased remuneration." And in general, the salary should be a recognition of ability and worth, and not an expression of offers received from other institutions. "The ideal condition is realized . . . when the institution carefully determines the market value of the services it receives, and fixes its salaries and grants increases accordingly."

The central idea of Dr. C. E. Marshall's discussion of the ethics of station work as between individuals was that "nearly every problem in agriculture may be attacked more effectively by the united forces than by any single agency."

Division of labor and cooperation therefore become of the highest importance, although a satisfactory adjustment in this respect is sometimes as difficult as it is important, and the greatest generosity is necessary on the part of all involved—"the administrator moving in one province, the research student in another, the one viewing life and the world quite differently from the other. Even in dealing with each other it is essential that broad and most charitable attitudes be assumed by research men. . . . An organization effected to foster

research work requires some one in sympathy with it to push it forward. It should not be a sympathy that tends to scatter but one to unify and at the same time to encourage individuality within the unity of effort. Individuality should not be sacrificed, for within it is found the very essence of creative work. If, however, the efforts of different individuals can be centered on some general big problem with the individual work contributing as factors, or subordinate problems, then the possibilities of harmonious investigations increase and the interest grows."

It was considered essential that when two or more research men are to undertake cooperative work they "should plan their relationships at the start and not at the end, and it should be done so clearly that a failure to grasp the situation will be practically impossible. There should be a constant interchange of ideas, but each should be held responsible, so far as feasible, for a particular phase of the work. . . . In all scientific work every man should receive his due, and it is a good policy to grant more than you actually think his due. Nothing can be more reprehensible than scientific stealing."

The considerations embodied in this discussion are fundamental. There are few subjects in the realm of station management which surpass them in importance, and upon their recognition rests in large measure the effectiveness of the station's organization. It is particularly fortunate, therefore, that the subject was taken up for discussion. It was not exhausted, but attention was called sharply to several matters which have often been allowed to drift without any definite policy, and this will lead to further attention along the general line of what may properly be expected as between institutions laboring for a common cause, and as between institutions and their working force.

No one will question that the widest possible liberty and freedom should be given to the individual—that he should be made to feel that the dignity of his position is fully respected, and that he is to be left to work out the problems in his own way. No narrow or commercial view is warranted. The station investigator "is not simply a unit to be counted," but should be recognized as having a virile individuality which it is his right to exercise.

On the other hand, the allegiance which he owes to the institution which employs him and provides him with what he needs for his investigations and thus makes possible his effectiveness as an investigator—these things should not be lost sight of, or the further fact that the station represents the State in fulfilling a quite specific purpose, and is answerable to the public and to the Nation for the funds granted it and for it general conduct. This places the experiment station in a somewhat different position from a privately endowed institution, and inevitably makes conditions somewhat more exacting.

CONVENTION OF ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS, 1911.

The convention of the Association of American Agricultural Colleges and Experiment Stations at Columbus, Ohio, was the twenty-fifth annual meeting of this association, although its quarter centennial will not occur until 1912.

Commissioner Colman called a convention of representatives of the agricultural colleges and experiment stations which met in Washington in July, 1885. That meeting appointed a committee to act for the body, and the next meeting was called in October, 1887, after the passage of the Hatch Act. At that meeting a permanent organization was effected, and it has been regarded as the first regular convention of the present association. Two conventions were held in 1889, one at Knoxville, Tenn., in March, and another at Washington in November, so that 25 such gatherings have been held, not counting the initial one in 1885.

The Columbus convention began November 15 and continued through the 17th. The attendance was a large and representative one, and the meetings were of great interest. They were held at the State University, where excellent facilities were afforded for the general sessions and the meetings of sections, as well as for the comfort of those attending.

President's address.—The presidential address, by Dr. W. H. Jordan, dealt mainly with certain ideals of education, the need of leadership in agriculture, and the agricultural colleges in relation to these.

Dr. Jordan held it to be fanciful to expect that any large proportion of actual farmers will ever be college trained, and he pointed to the fact that in the past the influence of the agricultural college has been largely exerted through men who have become investigators, teachers, publicists, and managers of large agricultural enterprises, rather than through the distribution of practical farmers. Because of the real needs of the times it was thought that the material resources and the human knowledge at the command of the agricultural college, and the plans and purposes there merged, should be directed toward sound inquiry and the training of young men and women for such service as will only be rendered by the few.

In the vocational courses training in the fundamental sciences was pointed out as a requirement in making effective workers. The lack of this was thought to be a too prevalent weakness. "If the colleges expect to give their graduates a good start on the road to success as teachers and station workers they should seriously consider a curriculum that deals more largely with the fundamental sciences and less with agricultural technics as a superstructure." And, furthermore, "the man is best prepared for the life of a farmer who knows the most about the fundamental sciences and their relation to his vocation, and

for this reason I can but regard the time as inefficiently spent that is devoted in college to observations and exercises of an ultrapractical character or to gaining information that is easily acquired from the ordinary experiences of practical life."

He plead for the atmosphere of scholarship in our vocational institutions: "We should carefully guard and cherish the intellectual impulses and equipment of the teacher and the investigator, because they are the instruments whose edge must be fine if we are to be successful in rightly fashioning the minds and hearts of young men and young women and in laying open the hidden recesses of truth."

Dr. Jordan frankly admitted that his position with reference to extension work was antagonistic to the view that makes it a function of the agricultural college, coordinate with and of equal importance with the training of young men and women, to be maintained on an equal footing as to development and permanence. He held that "because of the strong trend toward the popularization of agricultural knowledge both within the colleges and stations and without, because of the sweep and strength of the agricultural extension movement which is taking such diverse forms and is so largely occupying the interest and energy of college and station leaders, there has never been a more critical period in the life of the colleges and stations or a time in which their efficiency for the accomplishment of their primal and fundamental purpose should be more carefully guarded."

While the college might be a source of advice and assistance in the extension instruction and secondary education when means were provided to enable it to do so, such aid should serve rather "to stimulate and supplement the activities of other agencies and of the various communities that are to be benefited, and should be so related to the colleges as in no way to hamper their academic work."

As to the advisability of Federal aid for secondary education, the speaker questioned whether we have any reason to doubt that the States will provide for advances in secondary education as rapidly as public sentiment, available pedagogical tools, and opportunity will justify new movements.

Commissioner Claxton's address.—Dr. P. P. Claxton, United States Commissioner of Education, in an evening address before the convention, dealt with the training of teachers for agricultural instruction. Referring to the very great increase in the number of students attending the colleges of agriculture and mechanic arts and the development of interest in work of this character in the secondary and normal schools, he pointed out the great demand for teachers, present and prospective, and stated that "if the public schools shall do what they ought to do" there would be a demand for 20,000 teachers of agriculture and manual training and domestic science. The present demand has far outstripped the colleges.

Dr. Claxton presented a recent interpretation of the Nelson Act by the Department of the Interior, making it applicable "for the instruction of teachers in agriculture, the mechanic arts, and domestic science at summer schools, teachers' institutes, and by correspondence, and in supervising and directing work in these subjects in high schools," permitting the entire appropriation under this act to be used in the above manner if necessary. He considered this an important extension. He suggested that every agricultural and mechanical college should have at least three teachers in its department of education—one to teach the teaching of agriculture, one of mechanic arts, and one of home making. He showed that, while 36 of the 50 colleges now offer some opportunity for the preparation of teachers in agriculture, "there is very little in most."

In conclusion, Dr. Claxton outlined his plan for increasing the effectiveness of the Bureau of Education, with estimates necessary for carrying out that program.

Committee on instruction in agriculture.—The report of this committee, presented by Dr. A. C. True, chairman, dealt with (1) the grouping of studies in college courses in agriculture and (2) the relation of rural economics to farm management.

Under the first head, the conditions as found at several agricultural colleges were reviewed, the grouping of studies in courses of chemistry and civil engineering at several colleges outside of this group being cited for comparison. Referring to a previous report of the committee on the arrangement of agricultural courses, it was stated that further study of the question indicates that some of the more elementary subjects in agriculture should be taught in the freshman year. The present increased requirements for entrance to college are one factor in making this modification desirable.

On behalf of the committee, Dr. Thomas F. Hunt presented a report on rural economics and farm management, indicating that there is a general consensus of opinion, although not entirely unanimous, that there are two classes of subject matter in the field of economics, one dealing with the farm as a unit (farm management) and the other with the community as a unit (rural economics). The committee concluded that the subject taught or investigated under the head of farm management, as related to the organization and management of individual estates, necessarily involves the application of the principles of economics, and that "these principles constitute the scientific basis of farm management and give this subject its only just claim for consideration as having a pedagogical value. . . .

"The mere collection of the details of methods of conducting different farms will not suffice; there must be the reference of these methods to some underlying principles. When this is done it is clear that farm management comes within the domain of economics, because the purpose of farming is to secure a profit from the use of the land and its equipment."

The committee urged the desirability of using the term rural economics as applicable to the general field of economics in its relation to agriculture and rural communities. "The term farm management may properly be restricted to that phase of rural economics which deals with the business organization and direction of individual farm enterprises, or, in other words, deals with the farm as a unit." The desirability of developing strong courses in both rural economics and sociology was emphasized.

Committee on graduate study.—This committee reported, through Dr. H. P. Armsby, chairman, that arrangements had been made to hold the fifth session of the graduate school of agriculture at the Michigan Agricultural College in the summer of 1912. Courses will be given on the physics, chemistry and biology of soils, agronomy, and horticulture; on animal physiology, beef and dairy cattle, swine, and poultry; on rural engineering, and on rural economics. The general principles of research and pedagogical questions relating to collegiate, secondary, and extension teaching of agriculture will be discussed at Saturday and evening conferences. The faculty will include teachers and investigators from European and American universities, the agricultural colleges, and the United States Department of Agriculture.

The report also referred to a recent bulletin of the Bureau of Education on "The facilities for graduate study in agriculture in the United States," to which reference has been previously made.[1]

[1] E. S. R., 25, p. 705.

Preparation of men.—The subject of the preparation of men for teaching and for experiment station work was presented in papers by Prof. Alfred Vivian, of Ohio State University, and Dr. H. J. Wheeler, of the Rhode Island Station.

Prof. Vivian held the best training for teachers or investigators in agricultural lines to consist in, "first, a good collegiate course in agriculture along the lines recommended by the committee of this association, this course to include a good foundation in general science, a fair introduction to the humanities, including a reading knowledge of German, a general survey of the whole field of agriculture, and a limited specialization in one department. Upon this must be built graduate study with the major in the line in which the student expects to devote himself. In connection with his major he should be introduced to the principles of good research and should do a part of his minor work in education."

Much of the dissatisfaction with the grade of teachers in agriculture was attributed to the tendency of institutions to draw into their work men who have had little or nothing beyond the undergraduate courses. "The average man with his B. S. from an agricultural college has been able to secure a position paying as much as the one open in pure science and the humanities to the man with his Ph. D. While such a condition of affairs exists there is little incentive for the agricultural student to prepare himself properly for his life work." It was suggested that a system of scholarships and fellowships to encourage graduate study on the part of exceptional men would give great returns in the production of efficient teachers and investigators.

Dr. Wheeler also considered the salary situation the "present great drawback in the way of securing better-trained men." The inequality which results when men of quite limited training are advanced to relatively good salaries in a few years after graduation tends to discourage advanced study.

In the training of men for college and station positions he took the ground that such men should be thoroughly trained in the use of the English language and should have a reading knowledge of both French and German. They should also be sufficiently trained in economics to hold sound views and promulgate only rational doctrine.

The specialist should avoid narrowness in his study, which should be thorough and systematic and should include the various sciences related to his specialty, considered in a broad way. He pointed out the advantages, for example, of such breadth of training for the agronomist, animal husbandman, horticulturist, etc., in making them resourceful and enabling them to see their problems clearly and attack them effectively.

College organization and policy.—The new committee on college organization and policy made its first report, through Dr. W. E. Stone. It dealt mainly with the attitude which the land-grant colleges should take toward the movement to popularize agricultural knowledge and improve agricultural practice. The committee took the view that these colleges should assume the leadership in these activities, and that the ultimate organization of these agencies should center in these institutions.

It was recommended that in practice a division of these various activities should be made into coordinate departments, (1) the college or department of agriculture, charged with college instruction; (2) the experiment station, charged with experimentation and research; and (3) the department of agricultural extension, charged with the extramural work of instruction, demonstration, and popular teaching of every form, and including such supervision of secondary teaching as may be called for.

The proposal to organize secondary teaching in the extension department developed considerable discussion and opposition, the present practice being more largely in favor of holding this in the college of agriculture.

Experiment station organization and policy.—The committee on station organization and policy reported that where station publications are to be sold the expense of printing the copies of the edition should not be charged against the Federal funds and the publications should be mailed under postage. As to attendance upon meetings of scientific societies, it took the view that the leading members of the staff should for their own sake, so far as they are able, attend the sessions of at least one such society annually, and that the best interests of the stations frequently demand representation at meetings and conventions. In such cases the expenses of the station's representative should be paid.

With reference to the relation of the station to extension, the committee reiterated its position "that nothing in the organization of extension work or its distribution should be permitted, on the one hand, to detract from the prestige of the station in the results of the work already accomplished, or, on the other hand, so hamper its staff with details as to interfere with their carrying out the work of investigation. . . .

"The extension department of the college should carry the common stock of agricultural knowledge to the farming public, leaving it to the station to directly or indirectly disseminate the special results of its investigations and demonstrate their application."

Committee on extension work.—The committee on extension work, through President K. L. Butterfield, chairman, presented a quite voluminous report dealing with the theory of extension work, its forms and definitions, present status, relationships to other agencies and departments, administrative organization and financial support, the training of workers, and some of the special problems of extension work.

The committee concludes that: "Extension work promises to be one of the very largest fields of endeavor in our whole agricultural question. It will attempt one of the largest tasks that the Government has ever endeavored to perform, namely, to reach effectively through instruction and inspiration at least 50,000,000 of rural people.

"The men who do this work must be men of vision, who have some comprehension of the fundamental character of the task, with enough imagination to conceive its importance and possibilities. They must have some of the missionary spirit. They must be men who see ahead of them a permanent life work. They must realize the significance of the rural problem and they must be ambitious to help solve the problem."

Additional legislation.—Much interest developed in the consideration of various measures for the promotion and development of agricultural education, experimentation, and extension, as defining the general policy of the association.

Dean E. Davenport advocated the endowment by the Federal Government of secondary education in the public high schools and State normal schools, the State colleges of agriculture for the special purpose of training teachers for these institutions, and a limited amount of extension teaching by the colleges "as a temporary measure until secondary education in agriculture can be fully established." When agricultural high schools are in operation such extension teaching as will be needed can be done from these schools instead of from the colleges.

Provision for traveling specialists or "efficiency men" was indorsed, to advise with farmers direct, to demonstrate approved methods, establish demonstration

fields, orchards, or other farm units, etc., these to be directly under the charge of the experiment stations.

Branch stations were considered undesirable, because such stations are unnecessary for purely geographical reasons, and they would either duplicate the principal station or become merely a demonstration farm. "In either case they would weaken research, not strengthen it. Large funds are needed for important research, and all experience shows that the funds should be concentrated as much as possible."

The separate agricultural school was held to be undesirable, for reasons which the speaker has already presented.

In discussing the same question of policy, Dr. W. E. Stone advocated the further support of the extension work in order to develop and strengthen it, but he did not advocate Federal support of secondary education in a broad and uniform system.

"It is my conviction," he said, "that public-school questions should be left to the respective States, and if so left we shall arrive at the practical and successful solutions of the industrial-education question far sooner through the efforts of many earnest seekers after the right methods, rather than by foisting a uniform and costly system upon all States alike."

He sympathized with the feeling that the original purpose in the Federal grants for colleges of agriculture and mechanic arts has been accomplished, that the agricultural movement has been given birth and nourishment, and has reached a stage where the several States should now sustain it.

Dean Thomas F. Hunt made a strong plea for vocational training, urging that if the Nation is to hold its intellectual and industrial place among the nations of the world such a training must be provided for boys and girls between the ages of 14 and citizenship. The value of a national measure would lie not so much in the money which it would appropriate as in the general educational policy which it would inaugurate.

"The first requisite to the development of local agricultural or industrial conditions is to have an educated man in each community charged with the responsibility of devoting at least a portion of his time to the problems to be solved." This would be supplied by a system of agricultural high schools. The speaker favored a measure which would provide in a broad way for the needs of the country in the direction of secondary agricultural education, the training of agricultural teachers, and the maintenance of branch experiment stations.

Assistant Secretary W. M. Hays maintained that "the great waste in country life is through ignorance," and that the big problem in eliminating this is the bringing of the body of knowledge now available into form and taking it to the people, young and old, who need it. He plead for an educational system to include not only the traditional subjects, but the vocational as well. He emphasized the importance of this in developing farm managers and leaders and in building up a more efficient body of farmers and a broader farm life. An essential feature of this movement is the development of agricultural teachers through the normal schools.

The present scope of this movement was explained, and the point was made that the work is broad enough for all the various agencies.

Commissioner P. P. Claxton spoke in support of aid to secondary education. He urged that this is a national question, comparing it in this respect to the conservation enterprises which know no State boundaries. He reviewed the terms of a bill suggested at a recent meeting of the National Society for the Promotion of Industrial Education, which aims to provide for secondary agricultural education in various forms.

In its final action the association again declared itself in favor of Federal appropriation in aid of extension work, in harmony with the autonomy of the several States as recognized in previous legislation. It also declared in favor of Federal aid for public schools of secondary grade providing education in agriculture, home economics, and manual training; but it failed to express itself in favor of appropriation for agriculture in normal schools, and it tabled a proposal to favor the establishment of branch experiment stations on the plan provided in a bill now before Congress.

Consideration of these matters was referred to the executive committee with power to act for the association, but preference was expressed for efforts to secure legislation for agricultural extension.

Plan for demonstration and farm management work.—A paper on The Farm Problem Extension Work of the United States Department of Agriculture, by Prof. W. J. Spillman, read by Mr. W. A. Taylor, set forth a plan for cooperation between the department and the States, the country being divided into agricultural districts, with provision for a system to cover the whole country. The method of organization and the advantages of the proposed plan were outlined.

A paper by Dr. B. T. Galloway of this Department briefly set forth the work which the Bureau has been engaged in under the title of the Farmers' Cooperative Demonstration Work in the South and the Farm Management Studies. Referring to the preceding paper, the belief was expressed that "there is need for a systematic study of the broad questions of farm management, and that the information thus gained will be of value in aiding the proper forces within the States in reorganizing and readjusting the systems of farm management on individual farms."

National soil fertility league.—The association was addressed by Mr. H. H. Gross, of Chicago, president of the National Soil Fertility League, who explained the object of the league to be the conducting of a nation-wide campaign to secure funds and support for direct aid to the farmers in improving their practice and increasing agricultural production.

Bibliographer's report.—The report of the bibliographer, Dr. A. C. True, dealt with the library and its use for college and station purposes. From a survey of the present condition of station libraries the conclusion was reached that "attention to the development of the library is not generally keeping pace with that given to improvement in buildings and laboratories or other station equipment."

The frequent lack of care bestowed on pamphlet literature was pointed out, and the matter of exchanges was held to call for more perseverance and discrimination. In the subscription for scientific periodicals and the purchase of handbooks, a well-matured administrative policy was said to be lacking in many institutions. "The advice of experts should always be sought in such matters, but consistent scrutiny by administrative officers is also required."

In view of the growing importance of the library as an aid in investigation, it was urged that "the time has come for a more generous provision for the care of the present collections, for their wise extension in the future, and for such bibliographical or technical work as will make their contents most available for the use of the investigator."

Some systematic instruction in the use of books and libraries in connection with the college courses in agriculture was advised. At present the student is usually left to his own devices in using books, and after leaving college he will usually be dependent upon libraries and books for keeping pace with advancement. The college "should surely send him out equipped for making the most intelligent use of the resources that will be at his command. . . .

"The number of inadequate, incorrect, or ambiguous references found in the greater number of scientific publications well illustrates the prevalence, to a deplorable degree, of carelessness or ignorance on the part of authors and publishers in this important matter. The annoyance and loss of time occasioned in consequence is part of the experience of every user of scientific literature."

Semicentennial celebration.—The committee on the semicentennial celebration reported, through Dr. A. C. True, that the plan to hold an international congress of agricultural education in 1912, to celebrate the anniversaries of the passage of the first Morrill Act and the act establishing the National Department of Agriculture, and the twenty-fifth anniversary of the passage of the Hatch Act, had to be abandoned on account of the failure of Congress to take action in the matter.

The committee recommended that the executive committee be instructed to make a special feature, at the next meeting of the association, of exercises commemorating the passage of these important acts.

Agricultural associations.—By invitation, Mr. N. Kaumanns, German commissioner for agriculture to the United States, presented a review of the development of German agricultural associations and a critique of similar associations in this country. He traced the history of the German cooperative associations and legislation pertaining to them, and described the various forms, relationships, and responsibilities of these associations.

In commenting upon cooperative organizations in the United States, he noted the almost entire lack of credit associations, which have played so prominent and important a part in Europe. This was considered a great drawback and to be responsible for much of the depletion of soils. Another deficiency noticed was the almost total lack of fraternal insurance among farmers to cover crop injury, live stock, etc.

"It seems to me," he said, "that the business sense of the American farmer has, in a way, retarded the regulating of farming and of selling on the cooperative plan. The American idea of farming from its earliest days has been influenced by the principle of absolute freedom and independence in the conduct of business, and this has been the cause of the suppression of communal interests. The American farmer is in no way attached to his land. He works especially for the large market and particularly for city trade. It may be said that he has always stood for free competitive farming; therefore the reverse of a cooperative association was the highest achievement of American agricultural efficiency."

Mr. Kaumanns prophesied great advantage from the development of agricultural cooperative enterprises in this country, resulting in "a real agricultural solidarity, which, in Europe, is a historic fact."

Forestry in colleges and stations.—In a paper entitled "Forestry; the part that colleges and experiment stations may play in its development," Prof. F. W. Rane, State forester of Massachusetts, laid emphasis on the restoration as well as the conservation of forests in certain parts of the country, and pointed out the need of the more widespread education of the people who are to own and manage the forest lands, a service which, he maintained, naturally falls to the land-grant colleges.

Recognizing the product of the forest as a crop, he urged that the subject "should be required in the agricultural courses to a point sufficient for a comprehensive knowledge of it, allowing students opportunities to specialize later on." Special schools for technical foresters have been provided, perhaps in sufficient number to meet present needs, but the speaker urged that "there is a great and growing need for a general forestry education sufficient to practice modern methods."

Treasurer's report.—The report of the treasurer, Dr. J. L. Hills, showed the association to be in good financial condition, with a balance to its credit of $3,604.76. The disbursements for the year amounted to $1,292.86, including $806.55 for reporting and printing the proceedings of the convention of 1910.

Resolutions.—The association adopted appropriate resolutions on the death of Dr. Matthew H. Buckham, president of the University of Vermont, and Dr. Edward B. Voorhees, director of the New Jersey Experiment Stations, both of whom had long been active members of the association and had served as its president.

The association also reaffirmed its position in reference to the United States Bureau of Education, commending its work and urging an increased appropriation, and instructing its executive committee to render assistance to that end.

An enjoyable social feature was a reception in the university armory on the evening of November 16, at which the delegates were given opportunity to meet members of other associations and the National Grange, in session in the city at that time.

Officers.—Officers were chosen for the ensuing year as follows: President, Dr. W. E. Stone of Indiana; vice presidents, Dr. E. W. Allen of Washington, D. C., President W. M. Riggs of South Carolina, Dr. Thomas F. Hunt of Pennsylvania, Director C. P. Gillette of Colorado, and Dr. P. P. Claxton of Washington, D. C.; secretary-treasurer, Dr. J. L. Hills of Vermont; bibliographer, Dr. A. C. True of Washington, D. C.; executive committee, Dr. W. O. Thompson of Ohio, Dr. D. H. Hill of North Carolina, Dr. E. E. Sparks of Pennsylvania, Dr. W. H. Jordan of New York, and Dr. H. L. Russell of Wisconsin.

Vacancies occurring in the committees on instruction in agriculture, graduate study, college organization and policy, and experiment station organization and policy were filled by reappointment of members whose terms had expired, so that no change occurred. In the committee on station organization and policy Dr. E. W. Allen was appointed by the committee to fill the vacancy caused by the death of Dr. E. B. Voorhees. In the committee on extension work Dr. H. L. Russell and Prof. W. D. Hurd were appointed in place of President K. L. Butterfield and President C. R. Van Hise, whose terms had expired.

The following were chosen officers of sections: *College section*, President J. H. Connell of Oklahoma, chairman, and Dean E. D. Sanderson of West Virginia, secretary; *Station section*, Dean F. B. Mumford of Missouri, chairman, Director R. W. Thatcher of Washington, secretary, and Mr. W. H. Beal of Washington, D. C., recording secretary; *Section on extension work*, Prof. G. I. Christie of Indiana, chairman, and Prof. A. B. Graham of Ohio, secretary.

SECTION ON COLLEGE WORK AND ADMINISTRATION.

The program of the college section was devoted entirely to a discussion of the physical and social factors in education, including gymnasium work, intercollegiate athletics, social activities, and public speaking.

Gymnasium work and athletics.—President W. J. Kerr discussed means of encouraging a larger proportion of students to engage in gymnasium work and other forms of athletics. He recognized the importance of physical training as a vital part of the scheme of education, but characterized athletics alone as inadequate. As a means of encouraging physical training, he recommended giving it recognition as an educational phase of college work and encouraging intercollegiate contests and all forms of outdoor sports on large and well-equipped playgrounds, cooperation of the other members of the faculty with the professor of physical education in organizing botanical trips, cross-country runs, and other like outdoor exercise, and required gymnasium work for all.

President J. H. Connell called attention to the fact that those in charge of physical training at the colleges are frequently so overloaded with team work that they have no time to devote to the average or exceptionally weak boy.

Intercollegiate athletics.—President H. J. Waters read a paper on "Ideals for intercollegiate athletics and means of obtaining them," in which he asserted the belief that the colleges should employ no professional coaches and no coach who does not have other college duties; that they should not use athletics for advertising purposes; that the department of athletics should become a department of proper student conduct, in which, among other things, athletics should take the place of foolish student pranks; that all college athletics should be on college grounds and with college students; that high scholarship should be required of those engaging in athletics; that recruiting should be abolished and freshmen not be allowed to engage in intercollegiate contests.

In this connection the importance of military drill as a form of physical exercise and training was pointed out by Dr. W. H. S. Demarest, of New Jersey.

Extravagant expenditures.—Means of discouraging extravagant expenditures and snobbery among university and college students was the subject of a paper by Dr. W. E. Stone, of Indiana. President Stone called attention to the fact that some of the colleges had recently been unjustly criticized by newspaper writers, and urged that the colleges be judged by their graduates and upper class men rather than by their freshmen.

He thought that extravagance and snobbery exist among students for just the same reasons that they exist among people outside of college, and that they could be discouraged by encouraging greater democracy among students, by some supervision of fraternity activities and the placing of responsibility upon the fraternities for the conduct of their members, by bringing the students in closer contact with the faculty in a social way and on committees having the supervision of expenditures of money, and, as a last resort, by the elimination of undesirable students who prove not to be amenable to college regulations or uplifting influences.

In the discussion of this paper, President J. C. Hardy emphasized the importance of creating an atmosphere in college which would not permit snobbery to exist, and of working toward the "aristocracy of efficiency" as an ideal.

Social activities of the student body.—President K. L. Butterfield, of Massachusetts, discussed means of promoting healthful activities in the social body. He expressed the belief that social activities along wholesome lines should be recognized as a legitimate part of college life, and recommended the bringing of students and faculty together on committees for the purpose of regulating and directing social activities.

He stated that at Massachusetts there is a standing faculty committee on student life, and this committee has eight subcommittees on such phases of student life as student organizations, social union, musical organizations, fraternities, publications, and other organizations.

Dr. C. A. Lory, of Colorado, also emphasized the importance of the faculty recognizing its responsibilities outside of the classrooms and keeping in close touch with the student leaders, working with them as far as possible, but in such a quiet way as to make the students feel that they are managing their own affairs.

Dr. H. L. Russell, of Wisconsin, described the system of student advisers in vogue at the University of Wisconsin, in which each student is assigned to some professor or assistant professor as his adviser, and this professor communicates to the parents of the student the fact that he has been placed in such an advisory position.

Promoting interest in public speaking.—Means of promoting greater interest among students in public speaking was discussed in a paper by Dr. D. H. Hill, of North Carolina, who deprecated all tendencies in modern platform work toward elocutionary effects, and stressed the importance of studied efforts on the part of the speaker to adapt himself to his hearers and to appeal rather to their judgment than to their emotions.

He recommended the establishment of chairs of public speaking, calling on more students to take part in public college functions, encouraging all extemporaneous speaking in college societies and scientific clubs, efforts to galvanize into life the old literary and debating societies, and cultivating the imaginative faculties by making the students acquainted with the great imaginative writers.

SECTION ON EXPERIMENT STATION WORK.

The subjects discussed in the section included the following: (1) Ethics of station work, (a) as between institutions, (b) as between the institution and the individual, and (c) as between individuals; (2) management of the business affairs of the station; and (3) the station library.

The first topic was treated in papers by President H. J. Waters, Director R. W. Thatcher, and Dr. C. E. Marshall, which are reviewed editorially in this issue.

The question of publishing lists of the Adams fund projects for the information of administrative officers and station workers was discussed by a number of speakers, and the matter was to be referred to the committee on station organization and policy for report at the next convention.

Business management of the station.—In discussing the management of the business affairs of the station, Director F. B. Mumford stated the ultimate aim of good business administration to be to secure the maximum of research with the funds available. He emphasized the importance of permanency of position and definite income for investigation as factors in securing and retaining the services of desirable men.

As to the assignment of funds, it was held that "the net result in any department will be greater if the men in charge know at the beginning of the year that they can count on having a definite sum of money for investigational work. It is not good business management to have 10 departments in the station working on various projects the cost of each of which is unknown to the investigators or to the director. If a definite apportionment is made each year, the tendency will be to discourage expenditures which are not directly beneficial to the particular projects in hand and the ultimate result will be greater research values for each dollar expended. The amount of the apportionment should be carefully considered in relation to the work actually accomplished and the projects proposed."

He described the forms of vouchers and receipts in use at the Missouri Station in handling the different funds, as well as the methods of classifying the mailing list and the publications of the station to prevent unnecessary distribution.

Dr. J. L. Hills, in discussing the same subject, also recommended an annual budget, believing that "a careful advance plan as to probable expenditure is a wise procedure." The method followed at the Vermont Station is to apportion the funds in some detail at the beginning of the year, reserving an emergency fund of 10 per cent. The budget is made out on three different bases, (1) the 18 schedules of the Office of Experiment Stations, (2) the station departmental basis, and (3) on the basis of the several projects.

The station uses a voucher check, with different colors to indicate the funds upon which the checks are drawn. The plan has worked well and has greatly facilitated the assembling of receipts. The taking of inventories of station property from time to time was recommended.

In order to secure more efficient research, it is the plan in the Vermont Station to assign the college work of a man who has both college and station duties largely to a definite semester, leaving the rest of his time free for uninterrupted station work.

The budget system was commended by several other speakers, and Director E. H. Webster stated that at the Kansas Station the project and not the department was considered the unit, all apportionments of funds being made on the project basis.

Various methods of revising mailing lists were referred to, the general opinion apparently being that more frequent and careful revision is very necessary.

The station library.—In a paper on the station library, more particularly as distinct from the college or university library, Dr. E. H. Jenkins expressed the opinion that such a library should consist primarily of strictly technical treatises and journals dictated by and suited to the needs of those actually engaged in agricultural research and experiment.

"A station, whatever its relations to an educational institution, should have its own purely technical library, apart from any other, so that the members of the station staff can always have at hand and very near their place of work, and for as long a time as they need, the books and journals which they are frequently using." In the Connecticut State Station "each head of a department is in a sense his own librarian. The books which he uses are in his own study or laboratory and entirely in his charge. He and not the station librarian lends when desired by others and keeps account of them, save for a yearly general inventory made by the librarian of the station."

In that institution the specialist is, and in the opinion of the speaker should be, "the one solely responsible for the selection of books in his department, subject only to the limitations imposed by the station budget, and when there must be great economy, he should have his choice between books and other apparatus, for books are certainly to be reckoned as a necessary part of his apparatus. . . . Books are fully as important as apparatus. Their diligent and intelligent use should precede the use of apparatus in any elaborate research. They should be arranged according to the judgment or whim of the user and constantly at hand to invite attention."

"To the man who has the essence of an investigator in him, his library and the free use of it at any hour of the day are absolutely necessary. His reading will be a vital part of his work. To know how to read and what to read is a part of his education. The library, with the exchange of thought which it offers, the discipline in logic, the acquaintance with different habits of thought, points of view, suggestions of the bearings of one set of facts on problems waiting for solution, is increasingly important to the success of the station."

SECTION ON EXTENSION WORK.

Correspondence courses.—Prof. John Hamilton, of Washington, D. C., read a paper on "The correspondence course; its organization and methods," which was followed by a considerable discussion relating to the experience and success of such work at several institutions. There was much evidence that this form of instruction has an important place in the general scheme of extension work

and is being well received. In Pennsylvania the college now has over 3,500 persons taking these courses. Special correspondence courses for teachers were advocated.

Field agent in extension.—Another series of discussions related to the field agent, or what has been termed the "county representative." This was led by a paper from Prof. C. A. Zavitz, of Ontario, followed by Prof. C. E. Graham, of Hampton Institute, Virginia, and Prof. K. L. Hatch, of Wisconsin. This provides for personal assistance, the instruction and advising of the farmer on the ground in what he needs to know about, and, furthermore, an attempt to "look after the conditions of the community."

It was reported that in some cases the counties were willing to bear the whole expense, in others State funds are being used, and elsewhere special funds secured.

In Canada the plan is in successful operation, the representatives being paid in part by the county and in part by the department of education, the department of agriculture bearing the other expenses for office and travel.

In Alabama the system is also quite completely organized, with an agent in every county, and two in some of the larger counties, who devote themselves fully to the agricultural work of their counties.

Messrs. O. H. Benson and I. O. Schaub, of this Department, described the boys' and girls' club work of Southern States, conducted as a part of the Farmers' Cooperative Demonstration Work.

Woman's work in extension.—"Woman's work; its importance and place in the extension department" was outlined in a paper by Mrs. N. S. Knowles, of Iowa, and was further discussed by Mrs. C. W. Foulk, of Ohio, and Mrs. H. W. Calvin, of Indiana, the discussion turning largely on methods and requirements.

The two sessions of this section were not sufficient to complete the program, and two subjects, namely, the art of extension teaching and special training as a means of extension teaching, were deferred until the next meeting, when they are to be made a special order.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Sulphite method for separating and identifying calcium and strontium, J. I. D. HINDS (*Jour. Amer. Chem. Soc., 33 (1911), No. 4, pp. 510–514*).—This is a qualitative method, based on the fact that sulphite of strontium is only slightly soluble in water while sulphite of calcium is exceedingly so.

[In regard to methods for determining the fertility of the soil, particularly in reference to phosphoric acid], B. WELBEL (*Godichnyĭ Otchet Ploti. Selsk. Khoz. Opytn. Stantsiĭ, 15 (1909), pp. 167, 168*).—The methods which use weak solutions of organic acids for this purpose are not recommended, as such solutions often become infected. The use of antiseptics in this connection affects the results for nitrates and soluble phosphates, and, furthermore, interferes with the analysis of the other substances in the same solution. The employment of dilute mineral acids (such as 5 cc. of nitric acid, specific gravity 1.4, to 5 liters of distilled water) is preferred by the author.

Detection and determination of manganese in water, J. RODENBURG (*Chem. Weekbl., 7 (1910), No. 41, pp. 877–879*).—The method is as follows:

Fifty cc. of water is boiled for a few minutes with 5 cc. of a 50 per cent solution of nitric acid, enough silver nitrate solution is added to remove the chlorids present (but avoiding a large excess), and finally 10 cc. of a 10 per cent solution of ammonium persulphate. The solution is then heated to the boiling point. If manganese is present, even in amounts as small as 0.025 mg. (Mn_3O_4), the solution will assume a pink or red coloration.

If a quantitative determination is to be made, the above solution is filtered into a colorimeter tube and compared with other tubes of distilled water containing known amounts of manganese-ammonium sulphate.

The determination of arsenic in insecticides, E. B. HOLLAND (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 122–130*).—Previously noted from another source (E. S. R., 25, p. 615).

A method for studying chemical cell functions and the results obtained with it, M. HAHN (*München. Med. Wchnschr., 58 (1911), No. 26, pp. 1385–1388*).—A method is described which uses the Buchner press for obtaining an extract of the substance in question and dialysis through parchment paper. Tests with it and gland extracts, such as those from the mammary gland and pancreas, and the milk, are reported.

It was noted that after dialyzing extracts of the mammary gland and pancreas an increase in reducing substances (detected with Fehling's solution) takes place, which points to the possible presence of pro-substances. In the case of the mammary gland the author points out the necessity of studying the subject further, in order to determine if this increase in reducing bodies is due to either lactose or pentose formation.

The analysis of proteins by determination of the chemical groups characteristic of the different amino acids, D. D. Van Slyke (*Jour. Biol. Chem., 10 (1911), No. 1, pp. 15–55, figs. 2*).—This quantitative method, which was designed for the purpose of obtaining with small amounts of material an insight into the composition of proteins, was previously reported (E. S. R., 23, p. 303) in the form in which it was developed originally.

The author has now so modified the procedure that it is possible to indicate the nature of from 98 to 100 per cent of the nitrogenous products of hydrolysis with 2½ to 3 gm. of protein, "to follow the course of protein hydrolysis and detect the time at which it is complete, and for determining the ammonia (amid nitrogen), arginin, histidin, lysin, cystin, amino nitrogen not precipitated by phosphotungstic acid (the group of ordinary primary amino acids, leucin, alanin, etc.), and the nonamino nitrogen not precipitated by phosphotungstic acid (prolin, oxyprolin, one-half the tryptophan nitrogen). . . . The results of hydrolyses of wheat gliadin, edestin from hemp seed, dog's hair, gelatin, fibrin, hemocyanin (the protein from the blood of the king crab corresponding to the hemoglobin of higher animals), and of ox hemoglobin are summarized. . . .

"Comparison of the amounts of amino acids of the different groups present in proteins, found by the quantitative group determination method, with the amounts isolated in previous hydrolyses, indicates that the losses of isolation have fallen chiefly on the primary mono-α-amino acids, containing all their nitrogen in the —CH(NH_2)—COOH group. So far as can be judged from the analyses available for comparison, the presence of unknown amino acids outside of this group seems improbable. Whether the losses of isolating those of this group arise from the presence of new, as yet unrecognized mono-amino acids, or from the unavoidable losses connected with the methods of isolation, can not at present be stated."

Some factors influencing the quantitative determination of gliadin, J. E. Greaves (*Univ. Cal. Pubs., Physiol., 4 (1911), No. 6, pp. 31–74; Jour. Biol. Chem., 9 (1911), No. 3–4, pp. 271–293*).—This work was done with 6 different flours obtained from wheats having a high, medium, and low gluten content and grown at the dry-farming substations of the Utah Station. The work is summarized as follows:

The concentration of solutions of the alcohol-soluble proteins is decreased on filtering through layers of animal charcoal or on being clarified by shaking with this substance and then filtering, but clear filtrates can be obtained without materially changing the concentration of the solution by filtering through carefully prepared asbestos filters. When 7.985 gm. of flour was treated with 100 cc. of alcohol 0.05 per cent more alcohol-soluble protein nitrogen was extracted than when twice this amount of flour was used, and greater accuracy was also obtained in the gliadin determinations by means of the polariscope. The extraction of the alcohol-soluble proteins does not seem to be complete, especially with 70 per cent alcohol, when the proportion of flour to alcohol exceeds 2 gm. of flour to 100 cc. of alcohol. The amount of protein nitrogen extracted was found to be greatest with 65 per cent alcohol by volume, with a decrease as the strength of the alcohol increased. The specific rotation of alcohol-soluble proteins varies but little if any with the concentration of the solution, but alcohol of 74 per cent by volume more nearly extracts pure gliadin than does other strengths, and with a charge of 7.985 gm. of flour to 100 cc. of alcohol it extracts as much gliadin as does 70 per cent alcohol. The ratio of per cent nitrogen extracted from flour by alcohol to the polariscope reading for the solution varies with the strength of the alcohol.

The extraction of flour with hot 74 per cent alcohol in a closed vessel yields more protein nitrogen than does cold extraction, but the specific rotation of the proteins extracted shows that considerable nongliadin protein material is present. The heating of flour before extraction with alcohol decreases the amount of protein nitrogen extracted by 74 per cent alcohol. Some flours contain sufficient ether-soluble nitrogen carrying substances to affect materially the accuracy of gliadin determinations made by the direct extraction of flour with 74 per cent alcohol. The rotation of alcoholic extracts of flour is only slightly affected by changes in temperature and may, within certain limits, be disregarded in determining gliadin by means of the polariscope. With the flours examined it was found necessary to make a correction for the sugars in the polariscope method. Gliadin determinations can be made rapidly by means of the polariscope and the results thus obtained are fairly accurate, but not so accurate as those obtained by the Kjeldahl method.

See also a previous note (E. S. R., 20, p. 10).

New studies of proteoses, E. ZUNZ (*Acad. Roy. Belg., Bul. Cl. Sci., 1911, No. 8, pp. 653–734*).—The results of an exhaustive study of proteoses are reported in comparison with the work of other investigators.

Purification of insoluble fatty acids, E. B. HOLLAND (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 131–134; Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 171–173*).—This has been previously noted from another source (E. S. R., 25, p. 114), but in these articles it is treated in more detail.

The separation of liquid fatty nonsaturated acids and solid saturated fatty acids in mixtures of natural fatty acids and in regard to the ammoniacal salts of some fatty acids, P. FALCIOLA (*Monit. Sci., 5. ser., 1 (1911), I, No. 832, pp. 272–275*).—This is a discussion of methods and a description of the properties of ammonium erucate, laurate, linoleate, myristate, caprylate, caproate, crotonate, and butyrate. See also a note by David (E. S. R., 25, p. 12).

Chemical study of palm oils from different varieties of the palm tree, A. HEBERT (*Matières Grasses, 4 (1911), No. 35, pp. 2171, 2172; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 8, pp. 496, 497; Chem. Abs., 5 (1911), No. 16, p. 2747*).—"Eight samples of fruit from different varieties of the oil palm, *Elæis guineensis*, French West Africa, were examined, the oil being extracted by petroleum spirit; 6 were from the subspecies *E. nigrescens* (the fruit of which turns black before ripening), 2 from *E. virescens*, the fruit of which is first green, then red. The results follow:

"*Composition of the fruit and oils from different varieties of the palm tree.*

	E. nigrescens.				*E. virescens.*	
	Var. *Communis.*	Var. *Vulgaris.*	Var. *Sempernigra.*	Var. *Pisifera.*	Var. *Repanda.*	Var. *Gracilinux.*
Composition of the fruit:						
Pulp, per cent	35	28	30	80	34	77.7
Nuts and kernels, per cent	65	72	70	20	65.8	22
Kernels, per cent	18.0	.....	16.4	3.0	31.0	11.1
Yield of oil from pulp, per cent	41	43	52	59	62	52
Yield of oil from entire fruit, per cent	22	21	16	42	32	30
Melting point of fat	42°	42°	44°	45°	43°	42°
Specific gravity at the melting point	0.882	0.881	0.892	0.891	0.884	0.889
Saponification number	201	201	196	197	196	198
Reichert number	0.8	0.8	0.9	1.3	0.8	1.1
Iodin number	43.8	48.0	52.2	50.2	52.1	55.6
Hehner number	98.0	96.2	98.1	97.7	95.0	97.7
Melting point of fatty acids	46°	48°	48°	47°	44°	44°

"*Pisifera* and *gracilinux* have kernels too small and too hard to work to be of marketable value. *Communis* and *sempernigra* yield oils appreciated by the natives, and the fruit of *pisifera* is eaten fresh or cooked. The fat of *repanda* causes headache and sickness. The chemical values agree with those of common palm oils."

In regard to soy-bean oil and its properties, G. MARPMANN (*Jour. Landw., 58 (1910), No. 3, pp. 243–250*).—The author in this article discusses in a general way the culture, composition, and economic importance of the soy bean and the extraction of oil therefrom. He also appends the results of numerous examinations of Chinese and European soy beans and oils, which were obtained from various parts of the world. The oil content for the 1909 crop was 19 per cent, and that for the 1910 crop 17.2. Unfavorable weather conditions prevailed during 1910.

A new method for examining starch granules, W. LENZ (*Apoth. Ztg., 25 (1910), No. 80, pp. 777, 778, figs. 4; abs. in Ztschr. Angew. Chem., 24 (1911), No. 1, p. 43*).—A continuation of the work previously reported (E. S. R., 21, p. 522).

The soluble carbohydrates in asparagus roots, F. W. MORSE (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 135–140*).—This article has been previously noted from another source (E. S. R., 24, p. 509).

The composition of malt sprouts, K. YOSHIMURA (*Biochem. Ztschr., 31 (1911), No. 3–4, pp. 221–226*).—The malt sprouts used in this investigation contained 92.83 per cent of dry substance, 100 parts of which contained total nitrogen 3.824 parts, protein nitrogen 2.1, ammonia nitrogen a trace, nonprotein nitrogen 1.724 (of which 0.367 per cent was precipitable by phosphotungstic acid), total phosphoric acid 1.185, and water-soluble phosphoric acid 0.836.

In 1 kg. of air-dried malt sprouts there were present histidin, about 0.2 gm. cholin, and about 0.6 gm. betain. Arginin, vernin, and asparagin were not present.

Saccharose was not found, but maltose and invert sugar were probably present. The author thinks that saccharose is possibly produced from maltose and is again inverted by a secondary process.

Meliatine, a new glucosid from the buck bean, M. BRIDEL (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 24, pp. 1694–1696*).—This glucosid, which was obtained from the buck bean (*Menyanthes trifoliata*), was found to be hydrolyzable by emulsin.

As prepared by the author it is a white inodorous crystallizable substance, which is at first sweet but after some time becomes bitter. It is levorotatory.

Changes taking place during the spoilage of tomatoes, with methods for detecting spoilage in tomato products, R. F. BACON and P. B. DUNBAR (*U. S. Dept. Agr., Bur. Chem. Circ. 78, pp. 15*).—As good tomato ketchups or other tomato products are characterized by the presence of citric acid and invert sugar, but no tartaric, oxalic, and malic acids and a minimum amount of or no lactic acid, the authors have proposed to use these facts as a basis for detecting spoilage in tomato products. In doing this the amount of invert sugar, citric acid, and lactic and volatile acids are determined. The determination of the ammonia content of such products also serves as a partial index of protein decomposition.

Inoculation experiments with molds (Penicillium) and bacteria (*Bacillus coli*) and the examination of commercial pulp and trimming stock showed that molds apparently do not produce lactic acid as a result of decomposing citric acid, although citric acid is consumed during the vegetative process. Mold also breaks down the nitrogenous constituents of tomatoes and produces much ammonia. "The amount of ammonia so obtained is, for a pulp prepared from whole tomatoes, about twice as great as from a skin and core pulp. Thus, for

pulped whole tomatoes this figure is found to be about 0.04 per cent, while for pulped skins and cores it runs about 0.02 per cent." As regards volatile acids "it appears that butyric acid is a rather common decomposition product when the tomatoes spoil at a rather high temperature. At lower temperatures the acetic, lactic, and alcoholic fermentations seem to predominate."

On the average tomatoes were found to contain 6.4 per cent of total solids, which were composed of about 3.5 per cent invert sugar, 0.9 per cent protein, 0.5 per cent citric acid, 0.85 per cent crude fiber, 0.05 per cent fat, and 0.6 per cent ash. The sugar usually present is invert, with an occasional excess of levulose.

Methods for determining citric and lactic acids are given. The method for lactic acid is based upon the equations: $2C_3H_6O_3+10KMnO_4=2(COOH)_2+4H_2O+2CO_2+5MnO_2+5K_2MnO_4$ and $5(COOH)_2+2KMnO_4+3H_2SO_4=10CO_2+8H_2O+K_2SO_4+2MnSO_4$. In addition to the above, a detailed study of the behavior of lactic, malic, and tartaric acids toward oxidizing agents is given.

The volatile acids in honey, A. Heiduschka and G. Kaufmann (*Ztschr. Untersuch Nahr. u. Genussmtl., 21 (1911), No. 6, pp. 375–378; abs. in Ztschr. Angew. Chem., 24 (1911), No. 21, p. 996*).—Six honeys were examined with Auerbach and Plüddemann's method (E. S. R., 25, p. 311) and Wegener's method for their formic acid content. The amounts found with the first method varied from 0.006 to 0.01 gm., and with the second from 0.005 to 0.0073 gm., in 100 gm. of material. After treating honey with potassium hydrate comparatively high values were obtained for formic acid, viz., 0.0118 to 0.0229 and 0.0096 to 0.0208 gm., respectively. In the case of 2 honeys the reducing values for formic acid were found to be greater than the total volatile acid present in the samples. Lactic acid was not detected in any of the honeys.

Honey investigations, H. Witte (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 6, pp. 305–374; abs. in Ztschr. Angew. Chem., 24 (1911), No. 21, p. 996*).—As a result of examining 111 honeys by existing methods the author proposes as the maximum standard for water 30 per cent. The highest allowable content of saccharose is fixed at 6 per cent, higher amounts pointing to sugar feeding. Unripe honey is to be considered an abnormal product. Ley's reaction is considered a good aid for honey examination, while the Fiehe reaction can not be considered a better criterion for detecting adulteration, although it is a very valuable test for invert sugar. When a weak reaction is obtained care must be exercised in judging a honey adulterated, but in such cases a combination with the Auzinger reaction may furnish more satisfactory results.

The use of the Fiehe reaction as the preliminary test in honey examination, W. Hartmann (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 6, pp. 374, 375; abs. in Ztschr. Angew. Chem., 24 (1911), No. 21, p. 996*).—If from 0.5 to 1 gm. of honey is spread out in a dish and 2 drops of freshly prepared resorcin solution and hydrochloric acid (1:38) are added, a reaction is obtained for invert sugar if present, which is typical and the same as that which is obtained with the ether extract of honeys.

In regard to the utility of the newer milk-testing methods, E. Philippe (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 2 (1911), No. 1, pp. 1–36*).—The various newer tests, such as the leucocyte, Trommsdorff, catalase, reductase, fermentation reductase, and dirt methods, were investigated, and from the results and summary it is concluded that the leucocyte test is a practical method for detecting pathologic milks and for diagnosing udder disease. The test, however, is only reliable when a microscopical and bacteriological examination is made of the sediment.

The author recommends as an extension to the leucocyte test the determination of the catalase figure in both the ordinary milk as obtained from the cow and the milk filtered through cotton. A high figure will always point to a dis-

turbance of the activity of the mammary gland. A fermentation reductase test using methylene blue alone is a certain means to detect milk which is not fresh. The reductase test with methylene blue and formalin, according to the author, has no apparent advantage over the regular reductase test. The determination of the dirt content of milk should be made in all instances, using cotton disks as the filtering medium.

Yearly report of the Swiss Agricultural Institute at Zurich for 1910, A. GRETE (*Landw. Jahrb. Schweiz, 25 (1911), No. 3, pp. 197–212*).—This report reviews the activities of the station for the year 1910, and reports the results of examinations of fertilizers, regular and special feed stuffs, soils, honey, and copper sulphate.

Two new pieces of chemical apparatus, R. F. BACON and P. B. DUNBAR (*U. S. Dept. Agr., Bur. Chem. Circ. 80, pp. 3, figs. 2*).—The first apparatus described is for the continuous extraction of liquids with immiscible solvents lighter than water, and consists of 4 parts: A jacket flask; an extractor thimble; an ordinary Gooch funnel; and a condenser.

"(1) The jacket flask is made of glass tubing 2 in. in diameter and approximately one-sixteenth of an inch thick; it is 20.5 in. long and is enlarged to a diameter of about 3 in. at its lower or sealed end. . . . (2) The extraction thimble is an ordinary test tube having a diameter of 1.5 in. and a capacity of 100 cc. when filled to within 1.5 in. of the top. One-fourth of an inch from its top and on opposite sides of the tube are placed 2 holes about ¼ in. in diameter." (3) The Gooch crucible funnel used is 8.5 in. long. When dense liquids are to be extracted it is sometimes necessary to increase the length of the funnel. The lower end of the stem is ground at an angle of 45°. (4) A special condenser is designed to hang loosely in the jacket flask, but "a simpler form of condenser, which is just as efficient, may be made by sealing one end of a 1¾-in. tube and drawing it to a point. The open end is flared somewhat to permit the tube to hang in the jacket. The condenser tube is closed by a 2-holed rubber stopper, through which pass the inflow and outflow tubes."

The second apparatus was devised to give in a compact and easily manipulated form an apparatus which will allow of the measurement of an evolved gas without first sweeping out all air or other indifferent gases. It consists of (a) a graduated funnel tube, (b) a reaction chamber, (c) an absorption tube filled with glass beads, (d) a eudiometer, and (e) a leveling tube. A heating coil may be wrapped around the reaction chamber (b) when desired. The absorption tube, which is sealed to the eudiometer, fits into the reaction chamber by means of a ground joint. The apparatus has been used in the laboratory of the Bureau of Chemistry with accurate results to estimate citric acid by the Spica method and for the estimation of amino acids by the Van Slyke method (E. S. R., 25, p. 710; 26, p. 22).

Casein for clarifying cider and perry, A. TRUELLE (*Indus. Lait. [Paris], 36 (1911), No. 34, pp. 556, 557*).—Casein is not so good a clarifiant as gelatin for cider and perry.

METEOROLOGY—WATER.

Monthly Weather Review (*Mo. Weather Rev., 39 (1911), Nos. 6, pp. 815–972, figs. 2, charts 9; 7, pp. 973–1134, figs. 21, charts 9*).—In addition to the usual climatological summaries, weather forecasts and warnings for June and July, 1911, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 6.—The Drought of 1910–11 in North-Central Georgia and the Chattahooche River Basin, by C. F. von Herrmann; The Erosion of Sioux Point, South Dakota, by G. W. McDowall; Floods of the Upper Missouri River (illus.), by C. D. Reed; The Drought in the Ozarks of Southwestern Missouri in 1911, by J. S. Hazen; Notes on the Wind Movement at Point Reyes Light During June, 1911, by J. Jones; Notes on the Rivers of the Sacramento and San Joaquin Watersheds for June, 1911, by H. J. Andree; and Duty of Water Investigation in Idaho, by D. H. Bark.

No. 7.—The Drought of 1911 in North Carolina, by L. A. Denson; Floods of the Rio Grande and of the Rio Pecos, by F. H. Brandenburg; A Violent Local Storm at Abilene, Tex., by W. H. Green; Precipitation Averages for Large Areas (illus.), by A. H. Thiessen; Note on Earthquake of July 1, 1911, at Mount Hamilton, by R. G. Aitken; Notes on the Rivers of the Sacramento and San Joaquin Watersheds, by N. R. Taylor; and Precipitation and Altitude in the Sierra (illus.), by C. H. Lee.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 4 (1911), pt. 2, pp. 25–102, figs. 28, charts 6*).—This number contains the following articles: Summary of the Free Air Data at Mount Weather for the Three Years, July 1, 1907, to June 30, 1910 (illus.), by W. R. Blair; and Free Air Data at Mount Weather for January, February, and March, 1911 (illus.), by W. R. Blair.

Surface water supply of the North Atlantic coast, 1909, H. K. Barrows, C. C. Covert, and R. H. Bolster (*U. S. Geol. Survey, Water-Supply Paper 261, pp. 309, pls. 5, fig. 1*).—Measurements of flow of water in streams of the principal drainage basins from the St. John River in Maine to the Rappahannock River in Virginia are recorded in this bulletin.

Surface water supply of the Colorado River basin, 1909, W. B. Freeman and R. L. Bolster (*U. S. Geol. Survey, Water-Supply Paper 269, pp. 247, pls. 9, fig. 1*).—Measurements of stream flow of the Colorado River and its tributaries are reported in detail.

Surface water supply of the North Pacific coast, 1909, J. C. Stevens, E. C. LaRue, and F. F. Henshaw (*U. S. Geol. Survey, Water-Supply Paper 272, pp. 521, pls. 8*).—Measurements of flow of water in the principal streams of the drainage basins north of the California state line are reported, with descriptions of the drainage basins.

The movements of the subsoil water in Upper Egypt, H. T. Ferrar (*Survey Dept., Egypt, Paper 19, pp. VI+74, pls. 37, fig. 1*).—A continuation of systematic studies of the fluctuations of the level of ground water in the Nile Valley (E. S. R., 22, p. 616; 24, p. 216) as affected by irrigation and Nile floods is here reported.

The author concludes that in perennially irrigated lands of Upper Egypt the water level has probably been temporarily raised 4 ft. As regards groundwater conditions he divides the area studied into three zones parallel to the several reaches of the river and shows that in the zone nearest the river the fluctuation in the level of the ground water is inversely proportional to the distance from the river. In the so-called basin zone, further removed from the river, the water levels rise and fall as if actuated by an annual tide. "They begin to rise some 45 days after the flood has reached Egypt and attain a maximum after the crest of the flood has passed." The movement of ground water in the desert zone has not been definitely determined. "In our so-called riverain zone, the water moves at the rate of 150 meters per day at one period of the year, and at other seasons, namely, when the water table is stationary, it is practically stagnant. The water in the basin zone would seem to have a

velocity of less than 2 meters per day, and that of the desert zone a still lower velocity."

Modern methods of water purification, J. Don and J. Chisholm (*London, 1911, pp. XVI+368, figs. 96*).—This book attempts to discuss in an orderly way the numerous and varied processes which have been recommended for the purification of water and to consider how far their usefulness is determined by the character of the water supply. Much of the information here assembled has heretofore been available only in form of articles widely scattered through periodical literature. The subjects treated are sources of supply, storage, construction of reservoirs and care of filtered water, sand filtration, the management of sand filters, mechanical filters, purification by ozone, water-softening and household appliances, the testing of water, the problems of distribution, and useful constants and data relating to water filtration and measurements.

Sterilization of water by means of ultraviolet rays, Grimm and Weldert (*Mitt. K. Prüfungsanst. Wasserver. u. Abwässer. Berlin, 1911, No. 14, pp. 85–102, fig. 1*).—From a series of tests of the efficiency and cost of sterilization of water by means of ultra-violet rays the authors conclude that clear water with low bacterial content can be quickly and completely sterilized in this way, but that cloudy and colored waters are not so readily sterilized. By prolonged treatment the temperature may be raised sufficiently to bring about important physical and chemical changes in the water. The process is costly as compared with other methods of purification.

A bibliography of 28 references to the subject is appended.

Disposal of sewage on sewer farms, C. P. Jensen (*Pacific Municipalities, 24 (1911), No. 6, pp. 234–238; abs. in Engin. and Contract., 36 (1911), No. 7, p. 192*).—A brief account is here given of the disposal of the sewage of Fresno, Cal., by irrigation. The city has a farm of 812 acres on which to dispose of 4,000,000 gal. of sewage per day. At the present time 600 acres of this farm is used during the normal irrigation season and the sewage is disposed of during the winter months on a large cattle ranch, but it is believed that the sewage farm can be made to take care of the sewage during the entire year by rotating it on 20-acre plats.

The farm now yields sufficient income to pay the maintenance expenses of settling tanks, sewer farm, and outfall sewers 5 miles long. It is believed that in a few years it can be made to pay the total sewer maintenance charges. The sewage is now used upon 200 acres of alfalfa, which, it is estimated, will yield a net income of from $12 to $15 per acre when two years old.

SOILS—FERTILIZERS.

Studies in soil physics, E. E. Free (*Plant World, 14 (1911), Nos. 2, pp. 29–39; 3, pp. 59–66; 5, pp. 110–119; 7, pp. 164–176; 8, pp. 186–190; abs. in Jour. Wash. Acad. Sci., 1 (1911), No. 4, pp. 121, 122*).—In a series of five articles the author presents his own view of some of the more salient points of soil physics, emphasizing especially conceptions useful to the plant physiologist or ecologist. The titles and main conclusions of the individual papers are as follows:

"(1) The Physical Condition of Soils.—The range of physical conditions possible to a soil is determined by its ultimate physical nature or character, that is, by the nature, size, and number of the particles of which it is composed. The physical condition, within this fixed range, is controlled by the moisture content by virtue of the surface tension on the water films between the soil grains. (2) Movements of Soil Water.—The capillary actions in the soil are controlled by the forces of surface tension on the water films. Permeability is

a matter of the size of the individual interspaces of the soil, not of their total amount. (3) Soil Water and the Plant.—A very important but much neglected factor in the movement of water from soil to plant and through the plant is the evaporating power of the air. (4) Physical Constants of the Soil.—A critical examination of the various measurements which have been proposed as characteristic soil constants shows that all are in some degree unsatisfactory. The mechanical analysis in particular, is much less adequate than is usually believed. It is probable that another and better constant can be developed out of the water equivalent and the critical moisture content. (5) Soil Temperatures.—The main effect of the soil character upon its temperature is due to its water capacity. The wetter soil warms and cools more slowly."

A counting method for the mechanical analysis of soils, C. C. Fletcher (*Science, n. scr., 34 (1911), No. 876, pp. 495, 496*).—The method is described as follows:

"A definite amount of soil is weighed out, put in a sterilizer bottle with water and ammonia, and shaken in a mechanical shaker for at least seven hours. With most soils ½ gm. of material and 120 cc. water give a good dilution for accurate counting. A compound microscope with a micrometer eyepiece and a counting plate are necessary. In the micrometer used one scale division corresponds to 0.005 mm., the superior limit of the clay, and ten divisions to 0.05 mm., the superior limit of the silt. The counting plate is marked off in squares of 0.1 mm. a side. After removing from the mechanical shaker, the contents of the bottle are thoroughly shaken by hand and a sample for examination immediately taken from the center of the bottle. A drop is placed on the counting plate and the number of silt and clay particles in ten squares counted. The sand need not be considered. In most cases it settles quickly and escapes being taken in the subsample. If a sand particle appears in the subsample it is disregarded."

A factor must be used in obtaining a ratio to express the relative total weights of silt and clay in the soil. "In 26 soils of widely varying texture lately analyzed by the counting method, and checked by the centrifugal analysis, an average of the factors was 35. The factors varied, however, widely enough to preclude using this method as a regular routine analysis for all soils. . . . It should be used only where time is especially important or the facilities are not available for the determination of silt and clay" by centrifuging and evaporating.

Composition of some Massachusetts soils, J. B. Lindsey (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 339–348*).—Analyses of 13 carefully selected typical soils of Massachusetts as well as of a large number of miscellaneous samples taken from cultivated fields in different parts of the State are reported. Comparing the analyses of the typical soils with the ordinary standards indicates that none of the soils is highly productive but that most of them would probably be capable of producing satisfactory crops. The analyses of the miscellaneous samples indicate that most of them can at least be classed as normal from a chemical standpoint, some of them good, and a few rich.

The soils of the Armidale district and of Tenterfield, H. I. Jensen (*Agr. Gaz. N. S. Wales, 22 (1911), No. 8, pp. 699–711, map 1*).—The author reports the results of analyses of soils surrounding Armidale and Tenterfield, New South Wales, and discusses them in relation to their geology and crop adaptation.

The Tenterfield soils are typical blue granite, and are low in phosphoric acid and nitrogen and satisfactory as regards potash.

The soils of the Armidale district are classified as granite, alluvial, slate and sandstone, and basalt. The granite soils are derived mainly from biotitic and

porphyritic granite. They are acid and range from light to heavy loam. "The moisture content, the percentage of organic matter, and the nitrogen are usually rather low; the lime and potash generally satisfactory; but the phosphoric acid is less so."

The alluvial soils are all of good quality except an old leached alluvial of an auriferous drift. The alluvials from granite, although of excellent mechanical condition, are inferior in chemical composition.

The soil from light colored slate is "shallow, only 8 in., and the subsoils stony. When cleared it is tolerably good grazing country but of no immediate use for farming." The black chert and chloritic slate soils are a "deep shingly loam of a rich coffee color in some places and light brown in other places." They are stated to be superior soils excellently adapted for orchards and vineyards. Soils derived from an ironstone-conglomerate country are generally red or chocolate. "They are typically sweet and fertile soils, excellently adapted for grazing, orchard purposes, and general farming." The soils from white sandstone-conglomerate are poor and acid, growing straggling gum trees and a few oaks.

The basalt soils show a good chemical composition, containing an average percentage for nitrogen of 0.159, lime 0.597, potash 0.147, and phosphoric acid 0.207. Generally, basalt soils are stated to have a tendency to clog and to become impervious in wet weather, on which account they require frequent working and are probably excelled for general farming purposes by deep alluvials of mixed granite and basalt.

Soils of the Nyngan Demonstration Farm, H. I. JENSEN (*Agr. Gaz. N. S. Wales, 22 (1911), No. 8, pp. 671, 672*).—Mechanical and chemical analyses of 6 soils from the Nyngan Demonstration Farm are reported and show a deficiency in nitrogen and organic matter, satisfactory lime and phosphorus contents, and a good potash content.

The action of phosphorites on soils saturated and unsaturated with bases, K. K. GEDROĬTS (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 4, pp. 529–546*).—The author conceives of the soil as saturated and unsaturated with bases and distinguishes 3 classes of unsaturated soils, as follows: (1) Those with acid reaction to litmus and an acid water extract. Such soils are very deficient in bases and are mostly moor and heavy clay soils. (2) Those with acid reaction to litmus but with neutral water extract. Such soils are partly unsaturated with bases. (3) Those with neutral reaction to litmus and neutral water extracts. These are slightly unsaturated.

It is held that saturation with bases is not a function of the humus alone but of the mineral constituents of the soil as well. There is an exchange of bases between the organic and mineral constituents of an unsaturated soil, the larger proportion of bases going over to either constituent, depending upon its absorption capacity.

Saturated and unsaturated soils varied in the character of their absorption capacity in that there was an equal exchange of bases between added salt solutions and saturated soils, whereas with unsaturated soils there was, in addition to an exchange, an absorption of bases from the salt solution by the soil. The extent of this absorption was dependent upon the degree of "nonsaturation" of the soil, the strength of the solution, and probably also on the nature of the salt.

The author found that the action of phosphorites was always pronounced on unsaturated soils and that there was a relationship between the yield from phosphorite and the degree of nonsaturation. He emphasizes the importance of further studies on this subject, pointing out that the degree of nonsaturation

of the soil may have an important bearing on the action of other rather insoluble fertilizers, and fertilizers containing acid salts.

The influence of stall manure upon the bacterial flora of the soil, J. C. TEMBLE (*Georgia Sta. Bul. 95, pp. 35*).—Experiments are reported in detail in this bulletin which tend to show that the addition of cow manure to the soil greatly increases the number of bacteria, and that this increase continues over a considerable period. It was found that there was a larger increase in the number of bacteria in soil to which sterilized manure was added than in soil to which unsterilized manure had been applied. The addition of the manure also increased the ammonifying efficiency of most of the soils experimented with and this was true whether the manure was sterilized or unsterilized.

The nitrifying efficiency was as a rule increased by the addition of manure. This increase was greatest when sterilized manure was added to the soils, which were then inoculated by the addition of a small amount of unsterilized manure, indicating that the increase in nitrification was due to the introduction of nitrifying organisms the activity of which was promoted by nutrient substances supplied by the manure.

A bibliography is appended.

Report of the agriculturist, W. P. BROOKS (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 34–50*).—This is a report of progress in various experiments with fertilizers which have been going on for a number of years (E. S. R., 24, p. 233).

In a comparison of manure, sodium nitrate, dried blood, and ammonium sulphate as sources of nitrogen for a succession of crops in experiments which have been in progress since 1890, the relative efficiency of the different materials, based upon increase in crop as compared with no-nitrogen plats and taking sodium nitrate as 100, has been barnyard manure 78.85, dried blood 72.82, and ammonium sulphate 53.17.

In comparative tests of muriate and sulphate of potash the muriate was more effective in increasing yield in case of asparagus and oat hay, and the sulphate was more effective in case of rhubarb, blackberries, and potatoes. The percentage of starch was also considerably higher in the potatoes fertilized with sulphate.

In comparative tests of ammonium sulphate, sodium nitrate, and dried blood in combinations with muriate and sulphate of potash it was found that combinations containing ammonium sulphate were distinctly unfavorable to asparagus and onions but gave the highest yields in case of strawberries.

In a series of experiments comparing different forms of potash it was found that the average increase of yield of hay resulting from the use of potash exceeded that of the plats receiving no potash by only 600 lbs., indicating that the grasses (timothy and redtop), which made up the bulk of the first crop, "are not dependent in very high degree upon an application of potash." The potash salts were, however, distinctly favorable to the later growth of clover in the rowen. On the plats receiving ground feldspar, however, the clover rapidly disappeared, indicating that the potash of this material is not as available as that of potash salts.

In a continuation of the comparative tests of fine ground rock phosphates, phosphatic slag, acid phosphate, and bone meal, it was observed that the only phosphate which gave any considerable increase in merchantable potatoes was an Arkansas rock phosphate, but the results are not considered entirely conclusive as to the superiority of this phosphate. In fact, the results obtained in this series of experiments indicate that the potato is relatively independent of a supply of immediately available phosphoric acid. The application of available phosphoric acid, however, decidedly hastens the growth of the vine. The pota-

toes grown on the plats which had received phosphatic slag annually for a series of years were very scabby, although the seed had been treated with formalin before planting.

In the series of experiments comparing manure alone with manure and potash it was found that manure alone gave the larger yield of hay. The addition of potash to an average corn fertilizer increased the yield of hay as compared with that obtained with the fertilizer not so reinforced.

In the experiments comparing sodium nitrate, dissolved boneblack, and muriate of potash, it was shown that potash was the dominant constituent. Nitrogen was least efficient in increasing the yield of corn and soy beans.

The results of experiments in top-dressing grass lands with barnyard manure, wood ashes, and a mixture of bone meal and muriate of potash were inconclusive.

In a comparison of winter and spring applications of manure to grass land the results were slightly better with the spring application.

The direct assimilation of inorganic and organic forms of nitrogen by higher plants, H. B. Hutchinson and N. H. J. Miller (*Centbl. Bakt.* [*etc.*], *2. Abt., 30 (1911), No. 21–24, pp. 513–547, pls. 2, figs. 2; abs. in Jour. Chem. Soc.* [*London*], *100 (1911), No. 588, II, p. 920*).—A review of previous investigations on this subject is given, showing the direct assimilation of ammonium salts by beans, corn, and probably other plants; that various plants are capable of directly assimilating nitrites from dilute solutions; that only negative results as regards assimilation have been obtained with amidosulphonic acid, hydroxylamin, diamid, and azoimid; and that while the great majority of organic compounds have given negative results, more or less satisfactory evidence of assimilation has been obtained with methylamins, amylamins, allylamins, dimethylamin, acetamid, cholin, betain, leucin, urea, dicyandiamid, aspartic acid, asparagin, glutamin, allantoin, uric acid, hippuric acid, tyrosin, and humic acid. The gains of nitrogen have, however, generally been very small and in many cases negative results have been obtained by other investigators.

In sand and water-culture experiments under carefully controlled conditions with wheat and peas the authors obtained results from which they classify the various substances experimented with according to their availability as sources of nitrogen as follows: "(1) Readily assimilated—ammonium salts, acetamid ($CH_3.CO.NH_2$), urea $\left(CO<\begin{matrix}NH_2\\NH_2\end{matrix}\right)$, barbituric acid (with calcium carbonate) $\left(CO<\begin{matrix}NH.CO\\NH.CO\end{matrix}>CH_2\right)$, alloxan $\left(CO<\begin{matrix}NH.CO\\NH.CO\end{matrix}>CO\right)$, humates; (2) assimilated—formamid ($H.CO.NH_2$), glycin ($NH_2.CH_2.COOH$), (a) aminopropionic acid ($CH_3.CH(NH_2).COOH$), guanidin hydrochlorid $\left(NH:C<\begin{matrix}NH_2\\NH_2\end{matrix}\right)$, cyanuric acid $\left(CO<\begin{matrix}NH.CO\\NH.CO\end{matrix}>NH\right)$, oxamid $\left(\begin{matrix}CO.NH_2\\CO.NH_2\end{matrix}\right)$, sodium aspartate $\left(\begin{matrix}CH(NH_2)COOH\\CH_2.COOH\end{matrix}\right)$, pepton; (3) doubtful—trimethylamin, para-urazin $\left(CO<\begin{matrix}NH.NH\\NH.NH\end{matrix}>CO\right)$, hexamethylenetetramin; (4) not assimilated—ethyl nitrate, propionitrile, hydroxylamin hydrochlorid, methyl carbamate; (5) toxic—tetranitromethan. The above grouping is, of course, only provisional and applies only (except as regards ammonium salts) to peas. It is possible that other plants may be able to utilize some of the substances which with peas have given negative results."

The special apparatus devised for sterilizing the seed and growing the plants under sterile conditions in these experiments is described and a very complete bibliography of the subject is given.

Field trials with nitrogenous manures from the atmosphere, J. HENDRICK (*Jour. Soc. Chem. Indus., 30 (1911), No. 9, pp. 522–524; abs. in Chem. Ztg., 35 (1911), No. 93, Repert., p. 394*).—Comparative tests of sodium nitrate, ammonium sulphate, calcium cyanamid, and calcium nitrate on cereals, extending over several years, are reported and indicate that both calcium nitrate and calcium cyanamid are fertilizers of great value and activity but have certain undesirable physical properties which affect their suitability for general agricultural use. For example, the calcium nitrate readily absorbs moisture, which renders it difficult to handle, and calcium cyanamid is so dry and dusty that it is not only unpleasant but in a measure dangerous to handle. Neither is considered well adapted to mix with other fertilizers.

In the author's experiments calcium cyanamid and calcium nitrate stored in small bags in a cellar gained considerably in weight and with about equal rapidity by absorption of moisture. In case of the former there was a small actual loss of nitrogen. When the calcium cyanamid was mixed with soluble phosphates there was a large reversion of the phosphoric acid and no loss of nitrogen, but such mixtures hardened after a time. Mixtures of calcium nitrate with other fertilizers rapidly became damp and sticky.

On the formation and decomposition of calcium cyanamid, M. ESCHMANN (*Über Bildung und Zersetzung von Calciumcyanamid. Diss. Tech. Hochschule Karlsruhe, 1910, pp. 83, figs. 16*).—This contains an introduction reviewing previous work on the subject, descriptions of analytical methods used in the examination of calcium cyanamid, experiments in the determination of equilibrium weights, and studies of methods of chemical determination of the decomposition products of calcium cyanamid.

The relation of nitrate of soda to the mechanical condition of commercial fertilizers, J. G. LIPMAN (*Jour. Indus. and Engin. Chem., 3 (1911), No. 9, pp. 655–657*).—Experiments in continuation of those of Cathcart (E. S. R., 25, p. 120) on the loss of nitrogen from fertilizer mixtures containing sodium nitrate showed that "mixtures of acid phosphate, muriate of potash, and nitrate of soda, with or without soil, gained a slight amount of water over the calculated. On the other hand, the corresponding mixtures containing their potash in the form of sulphate lost a slight amount of water in some instances. The differences were not great, however.

"At the end of 1, 2, and 3 weeks, respectively, 50 lbs. of each mixture were passed through a McWhorter fertilizer drill. No difficulty was experienced in drilling the material at any time, but it was noticed that where soil was added to the fertilizer, the mixed material passed somewhat more rapidly through the drill. A further examination of the mixtures was made at the end of 8 weeks, and it was found then that the contents of the bags could be readily crushed into fairly small particles.

"In view of the foregoing statements it appears entirely feasible to make up home mixtures of acid phosphate, muriate of potash, and nitrate of soda, a combination that, under average climatic and soil conditions, is sure to give the farmer the greatest amount of available plant food for the money invested."

The agricultural value of raw, calcined, and ground mineral phosphates, M. DE MOLINARI and O. LIGOT (*Ann. Gembloux, 21 (1911), No. 10, pp. 516–522, pls. 2*).—In continuation of previous experiments (E. S. R., 22, p. 324) 2 calcined and ground mineral phosphates were compared in pot experiments with oats on soil and sand with 2 raw phosphates and Thomas slag. There was no increase in yield from the pots receiving calcined and ground phosphates over those receiving the raw phosphate and in neither case was the yield appreciably different from that of pots receiving no phosphate. On the other hand Thomas slag produced very favorable results in increasing the yield.

The production of phosphate rock in 1910, F. B. VAN HORN (*U. S. Geol. Survey, Advance Chapter from Mineral Resources of the United States Calendar Year 1910, pp. 14; Amer. Fert., 35 (1911), No. 5, pp. 21–28*).—It is stated that the total production of phosphate rock in the United States in 1910 was 2,654,988 long tons, valued at $10,917,000, as compared with 2,330,152 long tons, valued at $10,772,120, in 1909. "The increase was mainly in Florida rock, although the Tennessee production also showed a considerable gain."

Statistics of exports and imports are also given, and methods of mining are described, as is the following simple field test for phosphate rock: "Place a small crystal of ammonium molybdate on the rock to be tested, then drop a little dilute nitric acid on the crystal. If the crystal turns yellow, it indicates the presence of phosphorus. The deeper the yellow the higher the phosphate content."

The lime in basic slag: A correction and addition, J. HENDRICK (*Jour. Soc. Chem. Indus., 30 (1911), No. 9, pp. 520–522; abs. in Chem. Ztg., 35 (1911), No. 91, Repert., p. 384*).—This is a further contribution to this subject (E. S. R., 22, p. 25), dealing particularly with the error in previous results due to loss of ammonia on distillation of dilute solutions of ammonium sulphate. The losses so found were too small to affect materially the general conclusions of the previous article, but the author is of the opinion that in view of the fact that some loss does occur "a solution of ammonium chlorid provides a better method of determining the available base in slag than distillation with a solution of ammonium sulphate."

Is hydrated silicic acid in burnt lime injurious to soils? H. IMMENDORFF (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 38, pp. 514–516; abs. in Illus. Landw. Ztg., 31 (1911), No 78, p. 741*).—The author reports experiments which showed that, contrary to the general teaching on the subject, limes containing high percentages (from 2.69 to 13.88 per cent) of soluble silicic acid had no injurious effect upon the soil when used according to the ordinary practice of liming. The author is of the opinion that not only are such limes not injurious to soils but that a certain amount of soluble silica is beneficial in connection with the formation of zeolites.

Limes and liming, J. L. HILLS, C. H. JONES, ET AL. (*Vermont Sta. Bul. 160, pp. 387–440, pls. 2, fig. 1*).—This is a very complete summary of information regarding the history of liming, the forms of lime used, the lime trade and cost of lime in various forms, the functions of lime in soils and in plant growth, and the practice of liming. It is stated that "the practice of liming is rapidly increasing in New England. Vermont produces about $200,000 worth annually, used mostly for building purposes, but increasingly in agriculture." It is urged that those who contemplate the use of lime should carefully study the practice of liming, as much damage may be done by ill advised use of lime.

In regard to fertilizing sugar beets with sodium chlorid, H. BRIEM (*Deut. Landw. Presse, 38 (1911), No. 72, pp. 827, 828*).—The author reviews different experiments by others comparing mixtures of sodium chlorid and ammonium sulphate with sodium nitrate on sugar beets, and emphasizes the favorable results obtained from the use of this combination of fertilizers as a substitute for sodium nitrate.

Commercial fertilizers, their composition, preparation, and use, A. RÜMPLER, revised by R. WOY (*Die käuflichen Düngerstoffe, ihre Zusammensetzung, Gewinnung und Anwendung. Berlin, 1911, 5. ed. rev., pp. 192; rev. in Chem. Ztg., 35 (1911), No. 81, p. 477*).—The fourth edition of this book was issued in 1897. In the present edition, the fifth, the work has been carefully revised and brought up to date.

[Compilation of analyses of fertilizing materials], H. D. HASKINS and L. S. WALKER (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 304–322*).—This is a compilation of analyses, made for the most part at the Massachusetts College and Station of chemicals and refuse salts, phosphates and guanos, ashes, lime compounds and marls, by-products and refuse substances, and animal manures, and continues work previously noted (E. S. R., 18, p. 220).

Commercial fertilizers in 1910–11, G. S. FRAPS (*Texas Sta. Bul. 140, pp. 21*).—This bulletin refers to the new fertilizer law enacted by the legislature of 1911, which, it is asserted, "gives much better protection to the consumer than the previous law," explains terms used in fertilizer analyses, and gives guaranteed and actual analyses and valuations of fertilizers registered for sale in Texas during the year ended August 31, 1911.

Commercial fertilizers, J. L. HILLS, C. H. JONES, ET AL. (*Vermont Sta. Bul. 160, pp. 299–386, 437–440*).—The results of analyses of 157 brands of fertilizers, representing 14 companies, are reported and discussed, in comparison with results of analyses of previous years. Ninety-three per cent of the brands met their guaranties. The crude stock used to furnish phosphoric acid and potash appeared to be of good quality. More mineral nitrogen was used than in previous years, even the low-grade brands of fertilizers containing it. Organic nitrogen of good quality was found in the goods of 10 companies.

"The average selling price was $31.41; the average valuation, $19.53. One dollar in three spent for mixed fertilizers was paid to the manufacturer, railroad, and selling agent for their work, while but two of the three were paid for plant food. But 56 cents' worth of plant food was bought for a dollar in average low grade goods, and 62 cents' worth in medium-grade goods. The average high grade brand, however, afforded 65 cents' worth for a dollar. Some Vermont consumers paid fully twice as much for plant food as did others."

AGRICULTURAL BOTANY.

Seed plants, flowering plants, or phanerogams, K. WILHELM (*Die Samenpflanzen (Blütenpflanzen, Phanerogamen). Vienna and Leipsic, 1910, pp. XVI+151*).—This is a systematic summary of families of seed plants and their more important genera and species, with special reference to their agricultural, forestry, technical, and medicinal uses, and with a supplement in which are briefly noted the more important cryptogamic useful plants.

Cacti in New Mexico, E. O. WOOTON (*New Mexico Sta. Bul. 78, pp. 70, pls. 18*).—The results of an extended study of the cacti of New Mexico are given. After describing some of the most obvious characters of the cacti, their geographical distribution is traced and their dependence on certain climatic and other factors indicated. A considerable portion of the bulletin is devoted to a discussion of the uses of cacti, and the results of attempts to grow some of the so-called spineless cacti in New Mexico are given. The bulletin concludes with keys and descriptions of the 63 species, embraced in 5 genera, which are known to occur within the area of New Mexico.

The variation of plants under the influence of lime and magnesia, D. WARTHIADI (*Veränderungen der Pflanze unter dem Einfluss von Kalk und Magnesia. Diss. K. Tech. Hochschule München, 1911, pp. VI+155, figs. 49*).—By means of water and sand cultures with rye, wheat, barley, etc., the author has sought to determine the influence of varying the lime and magnesium factors on plant growth and the behavior of the principal plant organs toward lime and magnesium compounds.

The author found, as have others, that the rôle of lime and magnesium may be beneficial or injurious to plant growth in proportion to the relative amounts

present in the culture medium. For the principal cereals, such as rye, barley, and wheat, the proportion of 1:1 gave the best results in sand cultures, while an increase or decrease in the ratio depreciated the total production by from 40 to 60 per cent. The lime factor was found to influence grain production more than that of straw, and an overabundance of lime depreciated grain, while magnesium in excess reduced the total straw production. In water cultures a ratio of 20 parts magnesium to 1 of lime killed all rye plants in 50 days, and a ratio of 10:1 checked growth to a considerable extent. The influence of the varying lime factor was least apparent in the early stages of growth but became very pronounced during the flowering period and at maturity.

A superabundance of magnesium had a drying effect on the leaf tips and growing points. In sand cultures there was often a recovery, while in water cultures growth stopped and the plants died. Where there was a great deficiency of lime the plants died from above downward, while if magnesium was wanting death occurred from below upward. The root development was generally stimulated by a favorable lime factor. The presence and character of the root hairs was found to be influenced by the ratio of lime to magnesium, a favorable lime factor resulting in well developed long root hairs while too much lime caused the production of short stunted root hairs but without any pathological appearance. An overproportion of magnesium checked the growth of root hairs and produced a pathological appearance.

The author claims that the theories of Loew relating to the function of lime in the nuclear development and of Willstätter regarding the lack of magnesium in chlorophyll production are confirmed by his experiments. He calls attention to a number of unfavorable factors that may be the cause of wrong inferences in pot experiments, and states that his investigations show that the strongest and best developed plants are the ones which exhibit the greatest differences in the effect of the lime factor.

The variation in the color of seeds and its practical application, G. RITTER (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1910, pp. 134, 135*).—Attention is called to investigations that have been made regarding the variation in color of seeds, particularly those of leguminous plants. Variation in color is held by the author to be due to the conditions under which ripening takes place, and a change in the color and weight of the seed from the normal condition is attributed to unfavorable conditions during ripening. The heaviest seed are those which are normally matured, and there is said to be a correlation between the color of the seed, their germination, the growth of the plants, and resistance to disease.

Inheritance of the "eye" in Vigna, W. J. SPILLMAN (*Amer. Nat., 45 (1911), No. 537, pp. 513–523, fig. 1*).—An account is given of the inheritance of color in cowpeas, the study having been made of a large number of crosses. The F_1 generation in all cases reported was solid in color, while the F_2 generation gave ranges of color from pure white to completely pigmented. The ratios of segregation are given and various hypotheses are proposed to account for their behavior.

Long versus short periods of transpiration in plants used as indicators of soil fertility, F. S. HARRIS (*Proc. Amer. Soc. Agron., 2 (1910), pp. 93–102*).—On account of the wide use of the measure of transpiration of plants grown for short periods as an indication of the fertility of the soil, the author has carried on an investigation with wheat plants.

The results indicate that with different treatments plants do not continue to transpire the same relative amounts during all the periods of growth. Where the transpirations for a limited period are compared, erroneous conclusions

may be drawn because of possible stimulation or retardation due to certain conditions. Attention is called to the desirability of studying the conditions which cause the irregularities in the relative transpiration of plants before satisfactory methods for the use of this factor in determining soil fertility can be definitely described.

Notes on the nature of nitrogen fixation in the root nodules of leguminous plants, J. Golding (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 582, 583*).—"Previous work is summarized, indicating that it is not only the acidity of the root sap, but also the removal of the products of growth, the supply of carbohydrate, and the slime production which must be regulated before artificial cultures of the organism can be expected to fix nitrogen to an extent comparable with that which takes place in the nodule. The ready adaptation of the organism to its environment must also be borne in mind.

"A new method described and demonstrated for the first time indicates that it is the reaction of the medium which plays an important rôle in nitrogen fixation. The cultures also disclose previously unobserved properties of the nodule organism."

On the cooperation and practical value of micro-organisms in the supplying of nitrogen of the soil and of the plant, B. Heinze (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. 29–78, pls. 2*).—The author reviews the present knowlegde of the subject, with particular reference to the results of his own work previously reported (E. S. R., 24, p. 326). He emphasizes especially the importance of bacteriological studies, particularly as regards the nitrogen supply of the soil, expressing the opinion that the clearing up of the question of soil humus in its biological relation to nitrogen assimilation is one of the most important, and at the same time one of the most difficult, problems of soil bacteriology.

Abnormalities of stump growths, G. H. Chapman (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 149–160, pls. 2*).—A study has been made of various malformations and abnormalities of the leaves of sprouts growing from stumps, with the hope of discovering the cause of these peculiarities and their relationship to other physiological diseases.

The abnormal condition of leaves shown by severe distortion and increase in number as well as size may be classed under the malnutrition diseases, due to functional derangement. It is brought about by conditions somewhat analogous to those produced by excessive use of nitrates or overfeeding, and is not allied to mosaic disease, which it somewhat resembles. The trouble does not appear to be of a permanent character, but seems to be due to an attempt on the part of the leaves to correlate their functions with a root area many times larger than normal.

The clogging of drain tile by roots, G. E. Stone (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 43–46*).—Accounts are given of the clogging of drain tile by tree roots, algæ, etc., and a description is given of a pear root that was found to have clogged a 12-in. drain tile. A preliminary account of this has been noted elsewhere (E. S. R., 25, p. 228).

Experiments relating to the prevention of the clogging of drain tile by roots, G. E. Stone and G. H. Chapman (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 35–42*).—The authors have for the past three years carried on experiments to study the effects of various antiseptic substances in preventing roots of different kinds from entering drain tile. In one series of experiments tiles were inserted in boxes and the joints calked with antiseptically treated fibers, in the second the bottoms of pots in which plants were grown were filled with chemically treated fibers of various kinds, and in the third series boxes were

used the bottoms of which were covered with wire netting, underneath which was a body of water separated by about a half inch from the bottom of each box.

The results obtained from the different methods of treatment show that it is possible at the present time to prevent root growth by the use of certain chemical substances. The best results were obtained with excelsior or sawdust treated with creosote. Sodium arsenate was quickly washed out and lost its effectiveness in a short time.

Injury through smoke and flue dust, H. C. MÜLLER ET AL. (*Ber. Agr. Chem. Kontroll u. Vers. Stat. Pflanzenkrank. Prov. Sachsen, 1910, pp. 20–22*).—Brief notes are given on a number of investigations that are in progress upon the effect of smoke, flue dust, gases, etc., from industrial works of various kinds.

The sulphur deposited on the soil from a neighboring briquet factory was found to have an injurious effect on the growth of rye. Chlorin from a chemical factory severely injured rye, the leaves turning yellow, an analysis of the injured plants showing they contained from 0.608 to 0.667 per cent chlorin. Coal smoke and dust are reported to have injured clover to an extent that cattle would not eat it when cut for hay. Rye was similarly injured and the flour was dark and uninviting in appearance. Beets either did not come up or those that did grow had their leaves covered with the dust to an injurious extent. Carbolineum and soda applied to the trunks of trees quickly killed them. Trees near potash works were injured and the leaves of horse chestnut trees had a much higher ash and sulphur content than normally.

Description of the comprehensive catalogue of botanical literature in the libraries of Washington, ALICE C. ATWOOD (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 87, pp. 7*).—This is a description of a catalogue in the Bureau of Plant Industry, the author catalogue of which contains about 50,000 entries. It is intended as an index of the botanical literature in the library of this Department, together with botanical works contained in other libraries in Washington, D. C., and vicinity. The subject matter represented by the catalogue, in addition to containing such entries as would be ordinarily expected in a botanical catalogue, also includes references to the subjects of horticulture, tropical agriculture, fibers, gums and resins, pharmacology, various special crops, seed adulteration and control, etc.

FIELD CROPS.

Dry farming investigations in Montana, A. ATKINSON and J. B. NELSON (*Montana Sta. Bul. 83, pp. 151–203, figs. 21*).—The author summarizes data secured during 6 seasons of dry farming investigations conducted on a number of demonstration farms in various parts of Montana, continuing work previously noted (E. S. R., 20, p. 1028; 23, p. 331). The precipitation during this period has been about the normal for this region.

Potatoes proved the most profitable crop grown with an average yield of 105.32 bu. per acre and an average net profit of $41.99. Among the grain crops winter wheat gave the best returns. Kharkov gave an average yield of 40.41 bu. and an average net profit of $21.30 per acre, but was grown only at the Fergus County Station. Turkey Red grown at all the stations throughout the period averaged 32.45 bu. in yield and $14.49 in net profit per acre. Among spring planted grains corn, Sixty Day oats, flax, and hull-less barley proved most profitable in the order named, while the most satisfactory forage crops were alfalfa and fodder corn.

Alternate cropping and summer tillage or fallowing proved more profitable than continuous cropping in case of grain crops. Fall breaking resulted in a

more profitable first crop than spring breaking followed immediately by corn planting. Summer tillage resulted in more profitable crops than untilled fallow, but in case of fallowed land practically no difference in yield of grain was obtained between the fall and spring plowed soils. About 5 pk. appeared to be the best average rate of seeding for dry land grain crops, and the yield appeared to be lessened if fall-sown grains were harrowed in spring. Grains drilled in the ordinary way gave in general larger yields than those planted in rows 24 in. apart and intertilled.

Grain investigations with wheat, oats, and barley, A. Atkinson (*Montana Sta. Bul. 84, pp. 207–230, figs. 3*).—The 5 years' work with wheat, oats, and barley herein reported was done under irrigation.

In a test of 20 varieties of wheat and emmer the white milling variety Stanley and the durum Kubanka yielded 49.75 and 47.54 bu. per acre, respectively, while Red Fife or Spring Fife also stood high in the list with a yield of 45.6 bu. per acre. The average straw yield was 2.74 tons per acre, and the average length of straw was 44.13 in. The weight ratio of grain to straw was 1:2.11. Periods of 130 days from seeding to harvesting, 75 days from planting to heading, and 55 days from heading to ripening are recorded. Irrigation water was applied at heading time. On the whole, durum wheat was the highest yielding type, common milling wheat being second and feeding wheat lowest. Early planting, about the middle of April, at the rate of 2 bu. per acre, yielded better than later planting and heavier seeding.

In a test of 27 varieties of oats Banner, White Danish, Siberian, and Swedish Select yielded 97.9 to 102.3 bu. per acre each. The Sixty Day, a superior dry land variety, stood next to lowest on the list with a yield of 73.9 bu. The proportion of hull for all varieties averaged 24.5 per cent, or nearly 6 per cent below the average for the continent. The average straw yield was 2.45 tons per acre, and the weight ratio of grain to straw was 1:1.88. The total growing period was 127 days, with 74 days from planting to heading. The spreading headed varieties yielded more heavily than those with a side or mane head. Early planting at the rate of 3 bu. per acre gave the best returns.

In a test of 33 barley varieties the two-rowed brewing variety New Zealand and the hull-less Guy Mayle produced the highest yields, 3,705.2 and 3.582.2 lbs. per acre, respectively. The average straw yield was 2.18 tons per acre, and the weight ratio of grain to straw was 1:1.45. The hull-less varieties gave the highest yields and the six-rowed varieties the lowest. The most profitable yields followed seeding about the middle of April at the rate of 1½ bu. per acre.

Tables state in full the data obtained in the tests.

Top-dressing permanent mowings, W. P. Brooks (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 10–17*).—These pages report the results of 3 years' tests of a mixture of slag meal with muriate of potash, low-grade sulphate of potash, and high-grade sulphate of potash as top-dressings for permanent mowings. Each of the 3 mixtures was tested both with and without nitrate of soda.

In the section of the field devoted to the test of slag meal and muriate of potash the average yield on the check plats during the 3 past years has been 1,419 lbs. per acre as compared with 3,133 lbs. where slag meal and muriate of potash were applied. The application of 150 lbs. of nitrate of soda resulted in gains ranging from 557 to 1,205 lbs. per acre as compared with average gains of 1,419 and 1,283 lbs. per acre, after applications of 200 and 250 lbs. respectively of nitrate of soda. The second crop was lighter on the nitrate of soda plats because of the difference in the relative abundance of clover.

On the portion of the field devoted to a test of slag meal and a low grade of sulphate of potash, an increase in proportion of white clover was noted. This

clover attained an unusual height and luxuriance. Nitrate of soda in amounts varying from 150 to 250 lbs. per acre produced only a slight increase on these plats.

Plats top-dressed with slag meal and a high grade of sulphate of potash gave an average annual yield during the 3 years of 3,351 lbs. per acre, while an addition of 200 lbs. of nitrate of soda apparently gave an average annual increase of 1,479 lbs. per acre.

In another section of the field a mixture of slag and high grade sulphate of potash with 150 lbs. of nitrate of soda per acre produced an average yield of 3,279 lbs. of hay as compared with 2,710 and 3,747 lbs. after applications of a mixture of the same fertilizers and 200 and 250 lbs. respectively of nitrate of soda.

Notes on the character of the herbage on the various plats indicate that the amount of white weed (*Chrysanthemum leucanthemum*) has greatly decreased in all the top-dressed portions and a less pronounced tendency in the same direction is observed in the case of buttercups and plantain. Top-dressing with slag meal and a potash salt was in all cases followed by an abundance of clover.

Top-dressing pastures, W. P. BROOKS (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 18–23*).—These pages report the results of applications of 500 lbs. basic slag meal and 300 lbs. of low-grade sulphate of potash to land pastured by milch cows. The author notes that the preference of the cows for the forage on the treated plats resulted in their being more closely grazed late into the autumn than was favorable to their best development. Nevertheless a thick mat of clover appeared the following spring in place of a dull, lifeless, moss-infested turf thickly starred with bluets (*Houstonia cœrulea*).

Alfalfa in Massachusetts, W. P. BROOKS (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 24–34*).—Directions for alfalfa growing in Massachusetts accompany discussions of the conditions essential to success with the crop and its value.

A new species of clover resembling white clover (Trifolium repens), R. VON WEINZIERL (*Wiener Landw. Ztg., 61 (1911), No. 1, p. 3; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 90, 91*).—The Vienna Seed Experiment Station receives from time to time samples of seed sold as white clover (*T. repens*), which are in reality seed of *T. parviflorum*, a very inferior plant. The testæ of these seeds are covered with papillæ instead of being smooth as in the case of the true white clover (*T. repens*).

Perfect flowers in maize, E. G. MONTGOMERY (*Pop. Sci. Mo., 79 (1911), No. 4, pp. 346–349, figs. 6*).—This article describes instances of the occurrence of perfect flowers in corn, and reports observations on plants grown from seed from such perfect flowered ears.

Results obtained by crossing corn and teosinte, J. E. VAN DER STOK (*Teysmannia, 21 (1910), No. 1, pp. 47–59, pl. 1; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 45*).—The author reports the results of unsuccessful attempts to cross corn and teosinte and combine the large ear of the corn with the great fertility of teosinte and its ability to resist chlorosis, a disease which frequently attacks Java maize. The first generation of hybrids resembled teosinte chiefly but were uniform and intermediate in kind, while in the second generation the original characteristics had all disappeared and still only intermediate forms were obtained. In the third and fourth generations marked chlorotic symptoms occurred and the fruitfulness and ear characteristics were still intermediate.

Arrangement of parts in the cotton plant, O. F. COOK and R. M. MEADE (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 222, pp. 26, figs. 9*).—This is a study

of the cotton plant from the botanical standpoint. It deals with the plant's structure and habits as affected by differences in the number, position, and arrangement of the leaves and branches on the main stalk, and the arrangement of the fruiting branches and their leaves and flowers. Special discussions are also given of the various flower parts and adjacent structures, of the hairs on the surface of the seed coat, and of the roots and underground shoots.

Relation of drought to weevil resistance in cotton, O. F. Cook (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 220, pp. 30*).—Attention is called to the fact that in large portions of Texas where drought prevails during the summer months, cotton can be successfully raised by selecting drought-resistant varieties.

Observations at the San Antonio Experiment Farm indicate that dry weather is an important factor in limiting the injuries caused by weevils. It caused a complete cessation of weevil injuries even after the weevils had survived the winter in unusual numbers and had begun to feed and breed in the buds of the young plants.

Proper cultural methods must be practiced in order to improve the quality of the fiber as well as to counteract weevil injuries. Earlier maturing long-staple varieties should replace the present late varieties.

Two additional measures of weevil resistance worthy of consideration in the humid region are the development of quick fruiting long-staple varieties, and the better organization of cotton growing communities so that only one type of cotton shall be grown in the one locality. Columbia cotton, originated by H. J. Webber in South Carolina, and Foster cotton, bred by D. A. Saunders for the Red River Valley of Louisiana and northeastern Texas, are mentioned as adapted to such conditions.

The author finds that rapidity of fruiting after fruiting has once commenced is more important than absolute earliness, and the setting of a crop of bolls in the shortest time after the flower buds begin to appear is the ideal form of earliness from the standpoint of weevil resistance.

German colonial cotton-growing enterprises, K. Supf (*Deut. Kolon. Baumwoll Unternehm., Ber., 12 (1910), pp. 123, table 1, pls. 13, dgms. 2*).—This report is a general review of the cotton-growing industry in the German African colonies, and consists in part of statements made by practical growers with reference to the success achieved in the culture of this crop. Commercial and other expert testimony regarding samples submitted for scoring is also given.

[Description of the oat plant], Böhmer (*Fühling's Landw. Ztg., 60 (1911), No. 18, pp. 609–616*).—A scheme is outlined for the description of oat plants and a classification of the principal varietal groups of cultivated oats is proposed.

The picking and handling of peanuts, W. R. Beattie (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 88, pp. 7*).—Directions are given for the harvesting, curing, storage, transportation, cleaning, and care of peanuts. Greater attention to careful methods of curing, thrashing, and storing the peanuts is advocated as a means of improving quality, likewise more attention to the condition of cars used for shipment.

Intensive potato culture in Ireland (*Fruit, Flower, and Veg. Trades' Jour. [London], 18 (1910), No. 27, p. 613; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 87, 88*).—It is stated that a few growers have successfully obtained early and late crops of potatoes from the same land in one season, and that the method has passed the experimental stage.

The assimilation of nitrogen by rice, W. P. Kelley (*Hawaii Sta. Bul. 24, pp. 20*).—In field trials continuing earlier work (E. S. R., 22, p. 29), the appli-

cation of ammonium sulphate was followed by increases in the yield of rice straw and grain but nitrate of soda appeared ineffective. Ammonium sulphate applied before planting was followed by greater yields than when applied at intervals during the growing of the crop.

In pot experiments the application of nitrates to the soil produced no apparent effect until near the heading period. Small increases resulted from applications made before planting and a somewhat greater yield was obtained after applications at intervals during the growing period. Ammonium sulphate apparently increased the height and tillering power and the organic ammonia contained in soy-bean cake produced considerable increase in growth.

The author finds that denitrification takes place in paddy soils and that ammonia develops to a considerable extent during irrigation, while the nitrates originally in the soil soon become reduced to a low minimum. The use of nitrates was followed by a slight increase in the ammonia of the soil, while the addition of soy-bean cake considerably increased ammonia formation and ammonium sulphate produced still more marked quantities of recoverable ammonia. At the end of one month's growth there was still a higher ammonia content in the ammonium sulphate and organic ammonia pots, while at the end of two months differences of the same sort but of unequal extent appeared in the field plat experiments.

Flask experiments indicate that denitrification is sufficient to account for the loss of nitrates observed in pot experiments and that considerable ammonification occurs in submerged rice soil. Sand cultures indicate that unhealthy and stunted growth results if nitrates are used as the only source of combined ammonia, while the use of ammonium salts resulted in vigorous and apparently normal plants.

The failure of rice to assimilate nitrates properly may be due to a lack of nitrate-reducing enzyms because of long cultivation of the crop under conditions unfavorable to their development.

Work in 1909 at the Vercelli Rice Experiment Station, G. Alice (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No 1, pp. 84, 85*).—Practically no increased yield followed the use of 2 quintals per hectare (178 lbs. per acre) of sulphate of potassium together with sulphate and organic nitrogenous manures, but there was an apparent increase in the value of the crop of 20 francs per hectare. Ground horn and ammonium sulphate gave better results used together than when applied separately.

Giana pyrophosphate has been used with good results upon extensive rice fields. The author gives a detailed physical, microchemical, and chemical study of this material with special reference to its solubility in water charged with carbon dioxid and in soil solution.

The successful control of weeds in rice fields has been attained by sowing rice to a depth of 4 to 5 cm. in an unwatered soil, and allowing it to germinate by the natural soil moisture. Tests to determine whether the germination of rice is lower on unflooded fields indicate that it will grow very well during the first period of its growth with the same amount of moisture that is necessary for all cereals, but that it grows more rapidly on fields that are very damp even though unflooded.

Seed roots in beet raising, H. Briem (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 6, pp. 901–918, figs. 9; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 45, 46*).—The author outlines the selection and other methods necessary to prevent degeneration and secure the really good seed which is increasingly demanded for seed production, and states what he regards as the most practical and convenient rules for cultivating the beet and harvesting the seed.

Use of sea salt as a fertilizer for beets, H. METTE (*Sucr. Indig. et Colon., 76 (1910), No. 22, p. 507; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 70, 71*).—On land abundantly manured and seeded to barley the preceding year an application of 400 kg. per hectare (356 lbs. per acre) of sea salt was followed by a yield of 29,540 kg. of beets per hectare (12.6 tons per acre) as compared with 27,228 kg. on the check plat, with a sugar content of 21.48 per cent and 20.58 per cent, respectively. The author regards these results as due to the hygroscopic action of the salt in gathering moisture from the atmosphere rather than to its direct physiological effects.

The German beet harvest, A. BARTENS (*Bl. Zuckerrübenbau, 17 (1910), No. 23, pp. 373–376; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 95*).—In view of the general belief that the sugar beet yields of Germany are decreasing and that the sugar content is correspondingly increasing, the author summarizes data as to the yields of beets and their sugar contents by 5 year periods from 1871 to 1910. He does not regard the figures as showing a decrease in yield or a relation between yield and sugar content.

Wheat experiments, C. G. WILLIAMS and F. A. WELTON (*Ohio Sta. Bul. 231, pp. 22, figs. 4*).—In 13 consecutive tests Dawson Golden Chaff, Gipsy, Poole, and Perfection gave the highest average yields. The results of 24 distinct tests conducted during 14 seasons indicate that the greatest net returns have resulted from sowings of 8 pk. per acre. During 1902–1910, seedings made September 22 have averaged higher in yield than those made at other dates between September 1 and October 27. In 7 years' tests no considerable advantage was obtained by rejecting medium to small disease-free kernels as seed.

Rotation tests indicate that good systems of rotation give larger yields and greater economy of production than continuous wheat growing. These tests included 17 years' work. Wide variation appeared in milling and baking tests of 41 varieties. Considering yield and the quality as determined by milling and baking tests Valley, Nigger, Gipsy, Hickman, and Perfection have been found among the best.

Tables present brief descriptions of the principal varieties of the wheats tested, and state the resistance to smut and lodging, the yield of grain and straw, and other data. Analyses of wheats of the sound varieties and of the products made from them are included.

The lower price of beardless wheats in comparison with bearded wheats (*Coltivatore, 56 (1910), No. 34, p. 503; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 81, 82*).—Analyses of the starch and wet gluten contents of 2 bearded and 2 beardless wheats are reported. The conclusion is drawn that the difference is insufficient to justify any prejudice against the bearded variety.

A possible new method of determining the variety groups of cultivated plants, with special reference to wheat, E. DE CILLIS (*Intorno ad un Possibile Nuovo Metodo di Determinazione delle Razze di Piante Coltivate, con Speciale Riguardo al Frumento. Naples, 1911, pp. 42, pls. 4*).—A method based mainly on mathematical deductions is described and its possible advantages are pointed out.

German agricultural plant breeding, P. HILLMANN (*Arb. Deut. Landw. Gesell., 1910, No. 168, pp. XXXVI+603+10, pl. 1, figs. 346, map 1*).—This book is a history of German plant breeding, including a description of the work carried on at the present time in both public and private institutions. As pointed out in this work, Germany has to-day 43 breeders of winter rye, 3 of spring rye, 61 of winter wheat, 23 of spring wheat, 5 of winter barley, 60 of spring

barley, 53 of oats, 23 of fodder beets, 21 of sugar beets, 17 of potatoes, 4 of kale, carrots, and similar crops, 8 of clovers and grasses, and 28 of leguminous plants.

The importance of pure seed, L. HILTNER (*Prakt. Bl. Pflanzenbau u. Schutz, 8 (1910), No. 12, pp. 137–152; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 79*).—The author discusses the great difficulty of obtaining pure seed and recommends the adoption of uniform regulations on this subject by international agreement. Definite recommendations on certain phases of the subject are made.

The determination of freshness and normal vitality in seed, L. HILTNER (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. 219–238, dgm. 1*).—This article points out the limitations of seed testing as a means of determining the commercial value of seed and discusses in this connection the influence of hardness of the seed coat and the degree of ripeness. The results of certain experiments are cited as illustrations.

Seed work, 1910, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 141–143*).—Tables report the results of germination tests of onion, tobacco, lettuce, cucumber, alfalfa, clover, and miscellaneous seeds and the result of seed separation of onion, tobacco, and lettuce seed. The author compares the results obtained in 1910 with those of 1909.

Proceedings of the Second International Conference on Seed Testing (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. 211–218*).—This conference was held May 13–15, 1910, at Münster in Germany and Wageningen in Holland. The proceedings of these meetings are here briefly summarized.

Calcium cyanamid as a herbicide for Cuscuta, J. P. WAGNER (*Jour. Agr. Prat., n. ser., 22 (1911), No. 29, p. 78*).—The results are given of several experiments in which a thin layer of calcium cyanamid was spread on meadows affected with *Cuscuta trifolii* directly after the first cutting. It is claimed that the Cuscuta was destroyed without injury to the crop.

HORTICULTURE.

[Report of the] asparagus substation, Concord, W. P. BROOKS (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 22–26*).—This is a brief progress report of work at the substation, which comprises (1) breeding experiments conducted cooperatively with the Bureau of Plant Industry of this Department with the hope of producing a rust-resistant type of asparagus, and (2) fertilizer experiments designed to throw light upon the special plant-food requirements of the crop.

In the breeding experiments, which are being conducted by J. B. Norton, a large number of crosses between selected plants have been made. Of these a few have resulted in offspring which seem to be almost absolutely immune to rust (E. S. R., 24, p. 544). These plants are being propagated for further trial.

In the fertilizer experiments the effect of the very thorough preparation which the soil received is still noticeable in the growth of asparagus on the check plats, and the varying treatments do not, as yet, show the differences which may be expected later on. From the results thus far secured, however, it is concluded that plats receiving an application of manure at the rate of 10 tons per acre are not materially benefited by the addition of nitrate of soda alone, or by the addition of the complete fertilizer, composed of nitrate of soda, acid phosphate, and muriate of potash. The use of nitrate of soda in addition to a fairly liberal application of acid phosphate and muriate of potash has somewhat increased the yield, but when applied in excess of 311 lbs. per acre it has not resulted in a further increase.

In connection with the fertilizer experiments a study is being made by F. W. Morse relative to the effects of varying treatment upon the composition of the

roots. From the analyses so far made it appears that the amount of nitrogen in the roots in the fall is increased by application of nitrate of soda. The increase was greater where nitrate was used at the rate of 466 lbs. per acre than where it was used at the rate of 311 lbs. per acre, but no further increase was noted from a rate of 622 lbs. per acre.

The tentative conclusion is advanced that asparagus growers may frequently use nitrate of soda in excess of the most profitable quantity.

Methods of storing cabbage over winter in Holland, J. Hayunga (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 38, pp. 517–520, figs. 3*).—The methods employed are given, together with an illustrated description of a cabbage storage house.

Compilation of analyses of fruits and garden crops, H. D. Haskins (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 324–338*).—This is a revision of a previous compilation (E. S. R., 18, p. 241) to which has been added the analyses of a number of cereals and hays.

A complete handbook of fruit culture, E. Lucas (*Vollständiges Handbuch der Obstkultur. Stuttgart, 1911, 5. ed. enl., pp. XII+598, figs. 386*).—A handbook on fruit culture in Germany. Part 1 takes up the scientific principles involved in fruit growing, part 2 discusses nursery practices, part 3 takes up the details of growing fruit in the garden and orchard, part 4 discusses harvesting and marketing, and part 5 deals with the pomology of German fruits.

Apples and pears, G. Bunyard (*London and Edinburgh, [1911], pp. XI+115, pls. 8, figs. 5*).—A popular British treatise on the culture of apples and pears for the home and for the local market, including short selections of varieties for various purposes. A number of varieties are illustrated in color.

Garden and orchard (*Field Expts. Harper-Adams Agr. Col., and Staffordshire and Shropshire, Rpt. 1910, p. 52*).—The results of experiments conducted by the Harper-Adams Agricultural College with several apple trees for a number of years are here summarized. They indicate that root and branch pruning stimulate tree growth considerably, the effect being more marked on the weakest growing variety tested, Cox's Orange Pippin. The most fruit buds were formed on the unpruned trees. Cultivated trees have made more rapid growth than those grown in grass. In 1907 the turf was removed from around the stems of certain trees with a resulting increase in growth over trees grown entirely in grass.

Climatic adaptations of apple varieties, J. K. Shaw (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 177–245, pls. 3, figs. 13*).—This paper is based on a study carried on for the past 4 years relative to the effect of varying climatic conditions on varieties. Many samples of different varieties grown under widely varying conditions have been examined pomologically, and some of them chemically, and a study made of the pomological and meteorological literature available.

The author groups the causes of the great differences in apple varieties into the following classes: Cultural variations, soil variations, and climatic variations. Particular attention is here given to temperature, which is considered the most potent of the climatic factors and is discussed relative to its influence on the form, size, and general development of varieties. North America is divided into 7 apple belts which are named and illustrated and the distribution and adaptation of several well-known varieties are discussed. Tables are given showing the mean summer and optimum summer temperatures for a large number of varieties. The chemical analyses are also tabulated.

Continued study has confirmed the author's previous deduction that the variation in form of the Ben Davis apple grown in different localities is due

to climatic causes (E. S. R., 24, p. 241). Large seasonal fluctuations in form were also observed. Variation in the Ben Davis, and probably in other sorts as well, appears to be due principally to the temperature during a period of about 2 or 3 weeks following blossoming. The lower the temperature the more elongated the apple. The same influence is noted in the form of apples in different parts of the tree; those in the lower north portion are more elongated than those from the warmer, upper south portion.

The attainment of the highest quality, appearance, and keeping quality is very largely dependent on the warmth and length of the growing season, which is measured fairly satisfactorily by an average of the mean temperature for the months of March to September, inclusive. Such an average gives temperatures for the different apple belts ranging from 52 to 72° F. A departure of over 2° from the optimum mean summer temperature for any variety will result in less desirable fruit, this being more marked in long season varieties. A low summer mean results in greater acidity, increased insoluble solids, greater astringency, less coloration, decreased size, and scalding in storage, while a too high summer mean results in uneven ripening, premature dropping, rotting on the trees, poor keeping quality, lack of flavor, mealiness, less intense color, and decreased size.

Chemical analyses of from 2 to 20 samples of a number of varieties of apples received from different localities led to the deduction that each variety has a characteristic chemical composition which is fairly constant when perfect maturity is attained. Superior table apples are high in sugars, especially sucrose, and low in insoluble solids, indicating a tender flesh and fine texture. The ratio of acid to total sugars may vary somewhat to accord with different tastes. Good kitchen apples are wider in ratio of sugars to acid and the proportion of insoluble solids is of little significance. Good shipping apples are high in insoluble solids.

A peculiar case of bud variation with the peach, E. GRIFFON (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 10, pp. 521–532*).—The variation reported, which was verified by a commission of growers and botanists in 1910 and 1911, consists in the development of almond branches on peach trees. Flowering branches as well as immature almonds were observed, the latter falling off before they were fully developed. The sporting branches are to be propagated on both almond and peach stocks with a view of gaining further light relative to bud variation.

Directions for grape culture, J. DE BANO (*Instrucciones para el Cultivo de la Vid. Mexico: Govt., 1911, pp. 37, pls. 16, maps 2*).—A popular treatise on grape culture in Mexico, including a description with maps of the different viticultural zones, cultural details, and a discussion of varieties recommended for planting in different soils.

The seeds of Vitis vinifera and their significance for the classification of varieties, A. POTEBNJA (*Trudy Biûro Prīkl. Bot. (Bul. Angew. Bot.), 4 (1911), No. 4, pp. 147–165, figs. 2*).—This comprises data with discussion based on a study of the external seed characters of a number of species of Vitis with special reference to their use in the classification of varieties. Observations on 28 kinds of *V. vinifera* led the author to recognize 10 seed types which are herein described. From the study as a whole he concludes that there is as much variation between the seeds of different forms of *V. vinifera* as between the seeds of the different American species of Vitis.

California as a wine country, A. CLUSS (*Reprint from Allg. Wein Ztg., 1910, Nos. 32, 33, 37, pp. 34, figs. 5*).—An account of the California wine industry, based upon an inspection of the various grape districts of that State during 1908.

Citrus trees in the lower Rio Grande, W. C. GRIFFING (*Tex. Dept. Agr. Bul. 16, 1910, pp. 259–264*).—A paper on this subject with a discussion following.

The author concludes that citrus trees budded on *Citrus trifoliata* stock will not thrive on the silty, loam soils of the Rio Grande Valley. A Sour orange root is recommended as the proper stock in that section. Since the Satsuma does not thrive on the Sour orange root, it can not be profitably grown in the valley. Other varieties of the Kid Glove type of orange, however, make good growth and fruit prolifically on Sour stock.

The author concludes that most of the danger from freezing can be eliminated by maintaining continuous and vigorous growth during the summer months and by withholding irrigation and planting cover crops to draw the moisture from the soil during the winter months.

Curing the lemon, W. J. ALLEN (*Dept. Agr. N. S. Wales, Farmers' Bul. 47, 1911, pp. 21, figs. 11*).—A popular treatise based largely on methods employed in California. A description is also given of methods of handling citrus fruit in Italy.

The plantains, edible, ornamental, and fiber-yielding, R. LOPEZ Y PARRA (*Los Platanos, Alimenticios, Ornamentales y Filamentosos. Mexico: Govt., 1911, pp. 97, pls. 6*).—A treatise on the edible, ornamental, and fiber-yielding bananas relative to their botany, climatic and soil requirements, cultivation, insect pests and fungus diseases, harvesting, composition, returns, marketing, and products.

Cacao, its cultivation and curing, J. H. HART (*London, 1911, pp. X+307, pls. 15, figs. 38*).—A manual on the cultivation and curing of cacao, the subject matter of which has previously appeared in serial form (E. S. R., 24, p. 149).

Garden helps, G. P. HALL (*San Diego, Cal., 1911, pp. 120, pl. 1*).—A popular treatise on the culture of vegetables, aromatic and medicinal herbs, flowering plants, and shrubs in California, including general chapters on soils, planting, irrigation and cultivation, classification and propagation, fertilization, and insecticides and fungicides and their application. A calendar of operations and other miscellaneous information are appended.

Garden planning, W. S. ROGERS (*Garden City and New York, 1911, pp. XII+423, figs. 148*).—A popular work in which consideration is given to the arrangement and treatment of the several parts of the home grounds. An appendix contains lists of ornamental shrubs and plants suitable for different types of gardens, together with information relative to garden soils, fertilizers, geometry, tools, and appliances.

Lilies, A. GROVE (*London and Edinburgh, [1911], pp. XI+116, pls. 8, fig. 1*).—A popular account of the cultivated lilies, including information relative to their general culture in Great Britain and the treatment of different classes of lilies as grown in the garden and in pots. Notes are also given on a number of lilies not in cultivation, together with chapters on shrubs for association with lilies, raising lilies from seed, diseases, insects, and pests.

The modern culture of sweet peas, T. STEVENSON (*London, [1911], pp. 86, pls. 12*).—A treatise on sweet pea culture in England, the successive chapters of which discuss soil and situation, planting operations, staking, mulching, feeding and watering, preparing the blooms for exhibition, varieties for exhibition, garden decoration, market and indoor decoration, and early flowering in pots, the decorative value of sweet peas, and the enemies of the sweet pea.

Sweet pea troubles, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 1, p. 145*).—From the author's experience with sickly-looking sweet pea plants which have been sent to the laboratory for diagnosis, he is led to conclude that in the majority of cases the diseased condition is due to lack of knowledge of the

soil conditions required by this plant rather than to any specific organism. Brief suggestions are given relative to proper soil treatment for sweet peas.

Control of insect pests and fungus diseases, E. E. SCHOLL (*Tex. Dept. Agr. Bul. 9, 1911, pp. 23*).—A popular bulletin, discussing cultural methods of insect control, the preparation and application of insecticides, and fungicides and their uses.

Insect pests and diseases of the apple (*Bul. [Maine] Dept. Agr., 10 (1911), No. 3, pp. 16, pls. 2*).—This bulletin contains brief descriptions of the most injurious pests and diseases of the apple, including methods of control.

Lime-sulphur sprays for apple diseases, W. M. SCOTT (*Rpt. Va. State Hort. Soc., 15 (1910), pp. 174–184*).—In continuation of previous investigations (E. S. R., 23, p. 51), experiments with lime-sulphur sprays as substitutes for Bordeaux mixture in the treatment of apple diseases were conducted in Virginia in 1910, which for the most part corroborated previous results.

Lime-sulphur solution, so diluted as to contain 4 lbs. of sulphur in each 50 gal. of spray, proved to be a good substitute for Bordeaux mixture in the control of apple scab, fruit spot, leaf spot, and cedar rust. Bordeaux mixture, however, was superior to the lime-sulphur preparations in the control of bitter rot.

In spraying for bitter rot, the early lime-sulphur applications for scab may be followed at the proper time with Bordeaux, thus avoiding the russet and yet controlling the rot. Arsenate of lead may be safely and successfully used in combination with the dilute lime-sulphur solution for the control of the codling moth and other insects. A course of treatment best suited to orchards in Virginia and adjacent districts is outlined.

Further experience with fungicides and spraying apparatus, M. B. WAITE (*Rpt. Va. State Hort. Soc., 15 (1910), pp. 184–190*).—With some modifications the experiments to determine the effect of various sulphur sprays on the apple (E. S. R., 23, p. 651) were continued in the vicinity of Winchester, Va., in 1910. The test was conducted with the Yellow Newtown, York Imperial, and Ben Davis varieties. The plats contained the following treatments: Control, unsprayed; 3:3:50 Bordeaux; arsenate of lead used alone; copper sulphid; iron sulphid; self-boiled lime-sulphur; self-boiled lime-sulphur ½ and commercial lime-sulphur solution ½; commercial lime-suphur solution, 1½ gal. to 50; commercial lime-sulphur solution plus gypsum; commercial lime-sulphur solution, 1½ gal. plus lime. Arsenate of lead at the rate of 2 lbs. to 50 gal. was added to each of the mixtures.

With minor variations the mixtures gave identically the same results as in the previous year. None of the materials tested appeared to have enough superiority over the lime-sulphur solution, especially when combined with arsenate of lead, to justify their use. Notes are given on the progress being made in the machinery and equipment for spraying.

[Spraying experiments in 1910], H. S. REED (*Rpt. Va. State Hort. Soc., 15 (1910), pp. 190–196*).—Some experiments conducted by the Virginia Station for the control of foliage diseases of the apple are reported. The tentative results secured from one season's work are summarized as follows:

Apple foliage diseases due to frog eye spots were well controlled by the use of either commercial or self-boiled lime-sulphur without injury to the fruit. Bordeaux mixture was superior to lime-sulphur in the control of cedar rust. The use of Bordeaux is, however, out of the question on Black Twig, Ben Davis, and other varieties susceptible to russet injury, at least for the first 6 weeks after the tree blossoms.

The spraying of trees, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 47–51*).—A brief popular discussion of the equipment necessary for the

efficient and economical spraying of shade trees, based upon work which has been done along this line in Massachusetts.

A new type of spray nozzle, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 69–71, fig. 1*).—A type of nozzle, which has proved to be very satisfactory in spraying large trees from a high pressure machine, is illustrated and described.

FORESTRY.

The cost of growing timber, R. S. KELLOGG and E. A. ZIEGLER (*Chicago, 1911, pp. 18*).—The purpose of this paper is to outline a method of investigation into the cost of growing timber. Cost tables, based on data secured in some cases from actual stands and in others from extensive growth studies and timber estimates, are given for stands of white pine, loblolly pine, longleaf pine, red oak, and Douglas fir. The appendix also contains cost tables showing the charges for land and stocking, taxes, and administration and protection, by decades from 30 to 100 years at various rates of interest.

The authors conclude that because of the long investments required the cost of growing timber becomes unreasonable when high rates of interest are demanded, and that unless private capital is willing to engage in it for an income of from 4 to 5 per cent, the country must look to the state or national governments to grow the future timber supply.

Practical forestry in the Pacific Northwest, E. T. ALLEN (*Portland, Oreg., 1911, pp. 130*).—This work deals with the protection of existing forests and the growing of new ones from the standpoint of the public and that of the lumberman. An outline of technical methods is included.

A statistical review of the forest administration of the Grand Duchy of Baden for the year 1909 (*Statis. Nachw. Forstverw. Baden, 32 (1909), pp. XXI+151, dgms. 11*).—A statistical review for the year 1909 similar in character to the reports of previous years (E. S. R., 24, p. 44). Comparative data are given showing the financial returns from the crown forests for the previous 42 years.

A statistical review of forest conditions in Württemberg for the year 1909 (*Forststatis. Mitt. Württemberg, 28 (1909), pp. 98*).—A statistical review of forest areas in the various districts of Württemberg, yields of major and minor forest products, public sales by classes of woods, silvicultural operations, road building, labor conditions, and financial returns. A comparative table is given showing the financial returns from the state forest and hunting administration for the last 57 years. An appendix contains data relative to forest offenses and the area of state and corporation forests in the different districts.

Notes on experimental tree planting in southern Rhodesia, W. E. DOWSETT (*So. African Jour. Sci., 8 (1911), No. 2, pp. 60–66*).—A brief report on work carried out in the Rhodes Matoppo Park during the last 7 years. Notes are given on the behavior of tree species secured from various countries, together with brief descriptions of a number of indigenous trees.

A forest flora of Chota Nagpur, including Gangpur and the Santal-Parganahs, H. H. HAINES (*Calcutta, 1910, pp. VI+634+XXXVII, map 1*).—This comprises a systematic classification and descriptions of all the indigenous trees, shrubs, and climbers, together with the principal economic herbs and the most commonly cultivated trees and shrubs in the above regions.

Experiments with Scots pine seed from various sources, W. SOMERVILLE (*Quart. Jour. Forestry, 5 (1911), No. 4, pp. 303–312, pl. 1*).—Cooperative experiments are being conducted in Great Britain and in various countries on the European continent to determine the relative value of Scots pine seeds secured

from different countries and under varied climatic conditions (E. S. R., 24, p. 740). The results thus far secured from tests started at Brodie Castle, Scotland, and at Oxford, England, are here reported.

Uses of commercial woods of the United States, II, Pines, W. L. HALL and H. MAXWELL (*U. S. Dept. Agr., Forest Serv. Bul. 99, pp. 96*).—This is the second of a series of bulletins treating of the commercial woods of the United States (E. S. R., 25, p. 646). Thirty-seven species of pine growing in the United States are considered in turn relative to their physical properties, supply, and uses.

[Experimental rubber plantings in the Kongo], H. G. MACKIE (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1911, No. 4780, pp. 8–10*).—A brief progress report on experimental plantings of *Hevea brasiliensis*, *Funtumia elastica*, *Manihot glaziovii*, and other species of rubber, including notes on a number of wild rubber species found in the forest lands of the Kongo.

The coagulation of Ficus elastica latex, V. CAYLA (*Jour. Agr. Trop., 11 (1911), No. 118, p. 125; abs. in Agr. News [Barbados], 10 (1911), No. 246, p. 309*).—A new method employed in Java is described, which consists in the encouragement of coagulation by the addition of a coagulated latex. Each day about a pint of the thickest latex is taken and coagulation started by stirring with a wooden spatula. When it has arrived at the proper stage, this latex is added to the ordinary thin latex and the rubber separates out in about a quarter of an hour instead of in several hours as in the old method of beating the latex.

The whole art of rubber growing, W. WICHERLEY (*London, 1911, pp. 154, figs. 27*).—This work, which is based principally on rubber cultivation in tropical Asia, is intended as a handbook and guide to the selection, planting, and exploitation of the rubber yielding species which have proved to be adapted to countries and climates other than those to which they are indigenous.

Volatilization of various fractions of creosote after their injection into wood, C. H. TEESDALE (*U. S. Dept. Agr., Forest Serv. Circ. 188, pp. 5, fig. 1*).—Forty-eight specimens of sap loblolly pine were treated with various fractions of coal-tar creosote to determine the relative values of these fractions in protecting piling from the attacks of marine wood borers. The specimens were allowed to stand in the laboratory, open-piled, for 2 months or longer after the treatment in a temperature of from 60 to 80° F. They were weighed immediately before and after the treatment and at least once a week during the time they were piled. Data are given showing the distillation limits and yields in the redistillation of creosote, rate of volatilization of creosote fractions and creosote from treated wood, volatilization of oil from the wood 2 months after treatment, and the moisture content of the wood at the time of treatment.

Of 5 different fractions the lightest fraction lost at the end of 2 months 34.7 per cent of the average absorption per cubic foot, whereas the heaviest fraction lost only 4 per cent; commercial creosote losing 5.4 per cent. The results indicate the lighter fractions of creosote when separated by distillation and separately injected into sap loblolly pine will volatilize much more rapidly than the same fractions combined in the original creosote. It is suggested that when creosote containing both low-boiling and high-boiling oils is injected into wood the light oils volatilize chiefly in the outer portions of the wood and leave oil that is much less volatile, thereby sealing up the outer cells and preventing volatilization of the lighter oils in the interior of the wood. It is inferred that creosote to be of most value, at least for treating loblolly pine, should therefore contain considerable quantities of these high-boiling fractions.

Proceedings of the Society of American Foresters (*Proc. Soc. Amer. Foresters, 6 (1911), No. 1, pp. 112*).—In addition to the routine reports of the society for the year ended December 31, 1910, papers on the following subjects are included: Working Plans for National Forests of the Pacific Northwest, by B. P. Kirkland (pp. 16–37, with tabular data); Strip Thinnings, by T. S. Woolsey, Jr. (pp. 38–41); Hardy Catalpa, a Study of Conditions in Kansas Plantations, by A. E. Oman (pp. 42–52); Forests and Streamflow, an Experimental Study, by C. G. Bates (pp. 53–63); The Philippines as Source of General Construction Timbers, by H. N. Whitford (pp. 64–67); Economic Possibilities of *Pinus sabiniana*, by C. H. Shinn (pp. 68–77); History of the Investigations of Vessels in Wood, by C. D. Mell (pp. 78–91); Experiments in the Preservation of Forest Seeds, by E. Zederbauer (pp. 92–97) (E. S. R., 22, p. 739); Eucalyptus Possibilities on the Coronado National Forest, by R. L. Rogers (pp. 98–103); Notes on Management of Redwood Lands, by S. Berry (pp. 104–107); and Efficacy of Goats in Clearing Brush Land in the Northwest, by C. S. Judd (pp. 108–112).

DISEASES OF PLANTS.

Annual report on plant diseases, M. Hollrung (*Jahresber. Pflanzenkrank., 12 (1909), pp. VIII+356*).—This report, published in 1911, is a review of the literature which appeared in 1909 relating to plant diseases, insect pests, and methods for their control.

Some 1,442 titles are noted. The general arrangement and treatment of the topics are similar to those in previous reports.

Diseases of cultivated plants of the Tropics, G. Delacroix (*Maladies des Plantes Cultivées dans les Pays Chauds. Paris, 1911, pp. IX+595, figs. 70*).—This treatise on the plant diseases of tropical countries, based on the notes and work of G. Delacroix and edited by A. Maublanc, consists of 2 parts, the first devoted to a discussion of nonparasitic diseases in general and the other to parasitic diseases. Under the second portion after a discussion of parasitism in general, the general treatment of diseases of plants, and the parasitic nature of diseases, the author gives in detail the characteristics, means of control, etc., of diseases of coffee, tea, cacao, cotton, and sugar cane.

Preliminary list of the parasitic fungi of Fayette County, Iowa, G. W. Wilson (*Proc. Iowa Acad. Sci., 17 (1910), pp. 47–79*).—This is a list of 245 fungi parasitic on wild and cultivated plants.

Injurious insects and plant diseases—Legislation in Canada, C. G. Hewitt (*Gard. Chron., 3. ser., 50 (1911), Nos. 1281, pp. 21, 22; 1282, pp. 44, 45*).—The Department of Agriculture of Canada is empowered by the destructive insect and pest act of 1910 to take such action as may be deemed necessary to prevent the introduction or dissemination of injurious insects, pests, or plant diseases. It is given the power to inspect plants liable to be infected with certain pests, to destroy them if necessary, and to prohibit their importation into Canada.

The text of this act and the regulations issued under it are given in full.

The field laboratory, H. H. Whetzel (*West. N. Y. Hort. Soc. Proc., 56 (1911), pp. 17–23*).—In an address before the Western New York Horticultural Society the author emphasizes the need of field laboratories in solving plant disease problems, and cites instances of the great advances made in the control of certain diseases by the establishment of field laboratories.

The differential staining of intercellular mycelium, E. J. Durand (*Phytopathology, 1 (1911), No. 4, pp. 129, 130*).—The author gives a method of staining with hematoxylin and eosin, by means of which the intercellular mycelium

of *Puccinia graminis* on barberry leaves and of *Peronospora parasitica* in the stems of some crucifer were clearly differentiated.

It is claimed that in properly stained sections the mycelial threads are colored a deep pink in strong contrast to the blue coloring of the tissues of the host.

The life history and cytology of Sorosphæra graminis, E. J. SCHWARTZ (*Ann. Bot. [London], 25 (1911), No. 99, pp. 791–797, pl. 1*).—This is a more extended discussion of this parasite (E. S. R., 24, p. 742), in which its occurrence, the structure and appearance of the diseased roots, and the cytology and affinities of the organism are given.

S. graminis, associated with nematode galls, was found to be parasitic on the roots of various grasses. The fungus itself causes no hypertrophy of diseased roots.

An outbreak of rusts, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 1, p. 144*).—Attention is called to rusts of various plants which have been more or less troublesome during the season covered by the report. These include the rust on the apple, hawthorn, ash, hollyhock, rose, and quince. The apple rust is said to have been particularly common, and it is stated that the hawthorn has been affected to such an extent that nurserymen have become deeply interested in its control in their nurseries.

Note on the biology of the genus Septobasidium, T. PETCH (*Ann. Bot. [London], 25 (1911), No. 99, p. 843*).—This genus as instituted contains certain tropical and subtropical species of basidiomycetous fungi, included by previous authors under Thelephora, Lachnocladium, Corticium, etc., which encrust the stems, twigs, or leaves of various living plants with no noticeable injury to the host.

From an examination of a long series of specimens it has been determined that these fungi are parasitic on colonies of scale insects which they overgrow and destroy completely. They do not, however, live on the secretion of the insects but upon the insects themselves, and, therefore, they are biologically similar to the genus Hypocrella among the Pyrenomycetæ.

Timothy rust in the United States, E. C. JOHNSON (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 224, pp. 20*).—This paper discusses the present known distribution and relationship of the timothy rust (*Puccinia phlei-pratensis*), summarizes previous investigations of this disease in Europe and America, and gives new information on its physiological specialization, methods of winter survival, and the resistance of various timothy varieties to the rust.

The rust mycelium was found to live through the winter in plants grown at the Arlington Experiment Farm. Inoculation experiments showed that the rust can be easily transferred to various grasses, and by using bridging hosts it can infect several cereals which it will not attack directly.

The aecidial stage of this rust is not definitely known. In a study of the resistance of varieties of timothy to the rust in 1908 and 1909, W. J. Morse found that the resistance "ranged from 0 to 98 per cent." Greenhouse tests with resistant varieties showed a wide difference in the percentage of inoculated leaves which did not become infected when compared with the figures on rust resistance in the field, but when the severity of the infection and not the percentage of infected leaves was considered, the relative resistance of the various strains as obtained in the field was fairly well maintained in the greenhouse.

Breeding varieties resistant to this rust is suggested as a method of combating it.

American maize smut, T. H. JOHNSTON (*Agr. Gaz. N. S. Wales, 22 (1911), No. 4, pp. 319, 320, pl. 1*).—Attention is called to the introduction into New

South Wales of the American corn smut (*Ustilago maydis*) on Funk Yellow Dent, an American variety of corn. The smut was found on a few plants at the Bathurst Experiment Farm, and occurred on the stems, leaves, tassels, and ears.

Studies in plant diseases, B. F. LUTMAN (*Vermont Sta. Bul. 159, pp. 216–225*).—Brief accounts are given of some of the common diseases observed in Vermont, together with a description of experiments conducted in spraying potatoes to determine the effect of the treatment upon the plants.

Earlier investigations indicated that Bordeaux mixture has a stimulating effect upon the plant in addition to a protective one, and in previous trials (E. S. R., 24, p. 447) an attempt was made to determine what constituent of Bordeaux mixture produced the stimulus. In the present paper the results are given of experiments carried on with Bordeaux mixture and Bordeaux mixture to which iron sulphate was added. Different plats were sprayed with these fungicides, and in one lot only the lower part of the plants received the fungicide. The potatoes were harvested at different times, and before maturity the weight of the plants was determined.

From the results obtained it was found that the plants to which Bordeaux mixture had been applied stored more starch than those not so treated. Where iron sulphate was added to the Bordeaux mixture it seemed to have practically the same stimulating effect as the ordinary Bordeaux. As there was little or no disease present the fungicidal value of this mixture was not determined.

Potato diseases and the weather, B. F. LUTMAN (*Vermont Sta. Bul. 159, pp. 248–296, dgms. 20*).—The author gives a discussion of the relation of potato diseases to weather conditions, based on the data obtained by the station during the period covered by the 20 years' experiments on spraying for the control of potato diseases (see below).

During this period two severe blight infestations are noted and two periods when there is little or no disease. Rainfall is said to have much to do with the spread of the disease, and in general a rainy season is likely to be accompanied by an epidemic of blight and rot. However, in 1901 the rainfall was small, and it was one of the worst seasons on record, both as to the damage done to the foliage and to the tubers.

In connection with the reappearance of disease there is always to be borne in mind the manner in which the fungus causing it is perpetuated from year to year, and this brings up the hypothesis of the existence of some type of resting spore, as claimed by Jones (E. S. R., 22, p. 346).

Twenty years' spraying for potato diseases, B. F. LUTMAN (*Vermont Sta. Bul. 159, pp. 225–247*).—A summary account is given of the experiments which have been carried on for 20 years by the station on the control of potato diseases by spraying. The methods of applying fungicides and the results are given for the different seasons, and summarizing the work for the entire period the author states that by the application of Bordeaux mixture there was an average increase for the 20 years of 105 bu. per acre, or 64 per cent gain. The extreme range was 18 per cent gain in 1910, when there was no disease, as compared with 215 per cent in 1901, when diseases were very prevalent.

[On the primary infection of potatoes by late blight], G. H. PETHYBRIDGE (*Sci. Proc. Roy. Dublin Soc., n. ser., 13 (1911), No. 2, pp. 12–27*).—This is principally a controversial article on the infection of the potato crop with late blight (*Phytophthora infestans*) by means of mycelium derived directly from the planted tubers.

After a general discussion of the theories of various investigators on this subject and a statement of the results obtained from his own experiments, the

author reaches the conclusion that there is no evidence to support the theory that an epidemic of late blight can originate from the planting of infected seed tubers.

An explanation of "sereh" of sugar cane, H. H. ZEIJLSTRA (*Ber. Deut. Bot. Gesell., 29 (1911), No. 6, pp. 330–333*).—It is claimed that sugar cane is of hybrid origin, varying in its susceptibility to the attack of the "sereh" disease, which is an infectious disease the cause of which is as yet unknown.

The susceptibility of wheat to bunt (Tilletia) in relation to the time of sowing, O. MUNERATI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 11, pp. 835–840*).—The results of experiments on the susceptibility of wheat to stinking smut are given.

It was found that independent of certain other factors which are more or less favorable to the propagation of Tilletia on wheat, the temperature at the time of sowing and during the first stages of germination exercises a decisive influence on the receptivity of the wheat to the smut. A very early sowing of the fall wheats and a very late sowing of the spring wheats generally gave healthy plants. Late autumn or early spring sowings, accompanied by low temperatures and by the normal humidity during the first developmental stages of the plants, produced the greatest amount of bunt infection.

A spot disease of cauliflower, LUCIA MCCULLOCH (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 225, pp. 15, pls. 8*).—A description is given of a spot disease of cauliflower which was first called to the attention of the Department in 1909.

The leaves of the diseased plants were closely covered with brownish to purplish-gray spots 1 to 3 mm. in diameter. There were also larger diseased areas due to the coalescing of the spots. From these spots the bacterium was isolated and successful inoculation experiments made on the leaves of cabbage and cauliflower.

The organism is believed to be an undescribed form, and the name *Bacterium macklicolum* n. sp. is given it. A description is given of its morphology, cultural characters, and temperature and other relations.

Inoculation experiments seemed to indicate that it affects the leaves of cauliflower and cabbage, but the heads of cauliflower gave no satisfactory results when inoculated with the organism. The temperature relations are such that inoculations made during July, 1909, proved unsuccessful on account of the high external temperature. The organism is able to grow at temperatures below freezing, but it fails to grow at a temperature of 85° F. Usually the leaves attacked by the disease fall from the plant.

The effect of club root disease upon the ash constituent of the cabbage root, H. S. REED (*Abs. in Science, n. ser., 34 (1911), No. 868, p. 218*).—There was found in the roots of cabbage plants diseased by club root an appreciable increase in the amounts of calcium, magnesium, potassium, and phosphoric and sulphuric acids. The greatest increase was found in the potassium and appeared to be coupled with an increase of protoplasmic substance and an accumulation of starch. The proportion of calcium to magnesium and of potassium to sodium was greater in the diseased roots than in healthy ones.

Fusarium disease of cucumbers and other plants, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 62–65*).—The occurence of Fusarium diseases on a considerable number of plants is mentioned, after which a brief description is given of this fungus on cucumbers and other plants. In cucumber houses the disease has become serious within the past year, and in addition to cucumbers a summer crop of muskmelons was practically destroyed.

An opportunity has not been given for a thorough study of remedies, but as cucumber and other crops are generally severely forced, it is thought that mis-

management in handling the plants may have something to do with their susceptibility. The Fusarium trouble at present is believed to be incidental, attacking the weakened stems at the surface of the ground. Experiments are under way for methods of control of this disease.

A spinach disease new to Massachusetts, H. M. JENNISON (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 146–148, pl. 1*).—A description is given of a disease of spinach which has appeared in Massachusetts, a more extended account by Reed of the disease as it occurs in Virginia having been given elsewhere (E. S. R., 25, p. 846).

The trouble is due to the fungus *Heterosporium variabile*, and at Amherst it was found infecting winter spinach, growing on two widely separated lots. A careful examination failed to reveal any indications of the disease on young plants, and this seems to indicate that the fungus is not a true parasite but is able to infect old plants or those which have been injured in various ways.

No extended investigations have been made, but the author believes that the use of seed from healthy and vigorous plants, prevention of injury, and the application of better methods of cultivation would tend to the control of this disease.

Some diseases of apples and pears in 1910, F. C. STEWART (*West. N. Y. Hort. Soc. Proc., 56 (1911), pp. 61–65*).—The author discusses œdema of pear trees in nursery storehouses, failure of pear grafts, powdery mildew of the apple, trunk injury from veneer tree protectors, pruning apple trees affected with canker, russeting, spray injury, and keeping quality of apples. The first 4 topics have been previously noted from another source (E. S. R., 24, p. 549).

The author does not believe that apple trees should be unduly pruned to rid them of apple cankers, as there will always remain a sufficient number of spores clinging to the limbs and larger branches, and overlooked small cankers, to thoroughly reinfect the trees. He believes that keeping the trees in a vigorous condition by good cultivation and regular thorough spraying is the best method of control.

Bitter pit in apples, JEAN WHITE (*Reprint from Proc. Roy. Soc. Victoria, n. ser., 24 (1911), No. 1, pp. 19, pls. 9*).—The author gives the results of her investigations and experiments on the cause of bitter pit of apples, and reaches the conclusion that the disease is the direct result of spraying the fruits with poisonous liquids.

In an orchard under observation one part was sprayed with lead arsenate just after the petals had fallen, while another portion was left unsprayed. Apples from the sprayed plat showed bitter pit, while those from the unsprayed portion were free from this disease. It is claimed that the poison enters the stoma or lenticel and is carried through the intercellular canals, where it penetrates into the interior of one of the cells. All the cells in the young fruit, being meristematic, are in process of extremely rapid growth, and the cells surrounding that containing the poison divide actively on all sides, thus leaving the poison in the interior of the fruit without any apparent connection with the exterior.

Water core of apple, J. B. S. NORTON (*Phytopathology, 1 (1911), No. 4, pp. 126–128*).—From a historical study of the diseased fruit and from the conditions affecting the diseased trees the author holds that water core of the apple is probably due to sap forced into the seed cavities and intercellular spaces by excessive sap pressure under conditions of reduced transpiration.

Peach and plum troubles, R. D. WHITMARSH (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 161–176, pls. 2*).—Notes are given on a number of diseases of the peach and plum, among them brown rot, scab, leaf curl, and black knot, and

an attempt has been made to determine the cause of gum flow, which is quite prevalent on peach trees in the college orchard.

A study of the gummosis indicated that it somewhat resembles that described by Massee (E. S. R., 12, p. 156), but instead of a Macrosporium fungus accompanying the Cladosporium, the author found a species of Alternaria, which seemed to be of common occurrence. The gum on the fruit-bearing wood, appearance of the fungi, and histological changes accompanying gummosis are described, and suggestions regarding its treatment are given.

The suggestions for prevention include the removal of mummied fruits, pruning out of infected tissues, and systematic spraying with lime-sulphur solutions, directions for the preparation and application of which are given.

Crown gall, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 58–61*).—The author describes crown gall in raspberries, which is characterized by large abnormal swellings near the crown of the roots. It is thought, however, that the disease differs from that described by Smith and Townsend (E. S. R., 18, p. 950), as raspberries have been known to be affected for many years in the State, while fruit trees have only been recently so reported. Moreover, raspberries have been grown in close proximity to fruit trees in all stages of development without the slightest evidence of gall infection. Considerable difference of opinion is said to exist in regard to the effect of crown gall upon a tree, and it is believed that it is less to be dreaded in New England than in some other sections of the United States.

Anthracnose of Schizanthus, C. N. JENSEN and V. B. STEWART (*Phytopathology, 1 (1911), No. 4, pp. 120–125, fig. 1*).—Attention is called to a stem disease of Schizanthus plants growing in the greenhouse of the plant breeding department of Cornell University. This disease in the younger plants causes a sudden falling over of the stem, branch, or petiole at the point of lesion. In the older plants canker-like lesions appear on the stems or main branches, usually at the base of the petioles.

From a histological study of the lesions and from inoculation experiments the causative organism was found to be a new species of fungus, *Colletotrichum schizanthi*, a technical description of which is appended.

The chestnut disease (Diaporthe parasitica), G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 56, 57*).—A description is given of this disease, which was first described by Murrill (E. S. R., 19, pp. 250, 251), and an account is presented of its occurrence in Massachusetts.

The disease seems to be most abundant in the Connecticut Valley, but it is also reported from a few other widely separated stations. It has been suggested that it is less prevalent on high elevations than in valleys. The author reports a greater amount of winterkilling in the valleys than in the elevated portions of the State, and states that there is a significant coincidence in the appearance of the chestnut disease following the time when vegetation was so severely injured by the cold of the winter of 1903–4. He is of the opinion that the chestnut trees have not been in good condition during recent years, and thinks that there is probably some relation between this and the occurrence of the fungus. A more thorough investigation of the cause and distribution of the disease is to be made.

A pecan leaf blotch, F. V. RAND (*Phytopathology, 1 (1911), No. 4, pp. 133–138, figs. 3*).—Attention is called to a Mycosphærella leaf blotch of pecans found in Alabama, Georgia, Florida, South Carolina, and Ohio, due, it is claimed, to *M.* (*Sphærella*) *conrecula*. The cultural characteristics on artificial media and a technical description of this fungus are appended.

Notes on Peridermium cerebrum and P. harknessii, G. G. HEDGCOCK (*Phytopathology, 1 (1911), No. 4, pp. 131, 132*).—The author reports the successful inoculations with æciospores of *P. cerebrum* from *Pinus virginiana* to the leaves of several species of oaks, which resulted in the production of the uredinia and telia of *Cronartium quercuum*.

Successful inoculations by means of wounds were made with the teliospores of this rust on the young twigs of *Pinus divaricata*, *P. virginiana*, *P. ponderosa*, *P. murrayana*, and *P. sylvestris*. The galls resulting from these inoculations varied in shape from globoid to oblong, and were frequently accompanied by the formation of dwarfed cluster twigs or witches' brooms, especially on *P. ponderosa*, *P. murrayana*, and *P. virginiana*.

Attention is called to the close morphological resemblance of *Peridermium harknessii* and *P. cerebrum*, and it is stated that if *P. harknessii* is proved to have its alternate stage as *Cronartium quercuum*, the two Peridermiums are identical.

Shade tree troubles, G. E. STONE (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 52–55*).—The author calls attention to a number of troubles of shade trees, particularly of oaks and maples.

The oak trees examined seemed to be healthy so far as the trunks and larger roots were concerned, but the smaller roots for a considerable distance about the plant were dead. An examination made of the root system showed that there had been a constant dying back of the roots for a number of years, the exact cause of which was not determined.

The sun scald and sun scorch of maples are described, the sun scald being rather severe in its effect on the trees. Following the drying up of the bark a canker fungus (*Nectria cinnabarina*) is usually found in the case of the sun scald, and the presence of this fungus differentiates this trouble from gas injury, which is usually followed by profuse outgrowths of Schizophyllum and Polysticta.

The damping off of coniferous seedlings, C. M. GIFFORD (*Vermont Sta. Bul. 157, pp. 143–171, pls. 4, figs. 10*).—An account is given of investigations on the damping off of coniferous seedlings, in which the author found that the principal cause of the trouble is a species of Fusarium. Seedlings of white pine, Scotch pine, yellow pine, Norway spruce, and European larch appeared subject to attack under unfavorable conditions. The fungus appears to be a native of this country, and is widely distributed. It was repeatedly isolated from the roots of 2-year-old seedlings of the white pine.

The fungus grows readily in culture media, and fruits abundantly, producing 3 kinds of spores. The attack is made through the tender stems of the seedlings. In a short time the stem is weakened, its water supply cut off, and it soon dies.

The amount of damage due to this fungus varies with temperature and moisture, as well as with the reaction of the soil, an alkaline soil greatly increasing the amount of injury.

Experiments for the control of the damping off were carried on during the summer of 1909, sterilization of seed beds with steam and various strengths of formalin being tested. The sterilization of the soil by the use of live steam was found less effective than the use of dilute solutions of formalin. The formalin was found to reduce the percentage of germination to some extent, but, even considering the smaller stand, the results obtained from its use were quite satisfactory. In the use of steam, which was by the inverted pan method, there seemed to be a decided effect on the moisture content of the soil. Steamed and unsteamed soils were placed in tubes to determine the effect of steaming, and showed a decided difference in the capillary movement of water after standing for a period of 63 days.

The effect of lime and fertilizers as influencing the disease was investigated to some extent, and it was found that the disease was favored by the presence of lime. There seemed to be little difference between the different fertilizers used, except in the case of tankage and compost. Each of these gave excellent germination and a small amount of damping off.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Birds of Arkansas, A. H. HOWELL (*U. S. Dept. Agr., Biol. Survey Bul. 38, pp. 100, pls. 7, figs. 4*).—This is said to be the first detailed study to be published of the avifauna of Arkansas, which is remarkable for the variety and abundance of its bird life.

The introductory part of the bulletin deals with the physical features of the State, the life zones, economic value of birds, game resources and legislation, etc. Accounts of the occurrence, food, etc., of 255 species and subspecies accredited to the State, including observations made by the author and other members of the Bureau, follow.

"On account of the very limited number of observers many species have escaped detection which, by reason of their known range in adjacent regions, must certainly occur in the State. These species, 35 in number, are included in a hypothetical list . . . 67 species or subspecies may be considered as permanent residents, either nonmigratory birds breeding within its limits or migratory species that occur in both summer and winter; 75 are summer resident breeding species; 60 are winter residents; 69 are transients—that is, migrating species occurring in either spring or fall; and 19 occur irregularly as accidental visitors. Many species listed as summer residents and winter residents occur also more abundantly as transients. More thorough field investigations will doubtless increase the number of birds known to occur in the State to about 300 forms."

Woodpeckers in relation to trees and wood products, W. L. MCATEE (*U. S. Dept. Agr., Biol. Survey Bul. 39, pp. 99, pls. 12, figs. 44*).—This bulletin treats of the more strictly economic aspects of woodpecker work, points out wherein the birds are beneficial and wherein injurious, and in the latter case suggests remedies. It discusses the damage by woodpeckers in general under the headings of damage to trees, compensation for injuries due to food and nest excavations, damage to wooden posts and structures, and the prevention of damage, as well as the distribution and habits of the sapsucker group, the effects of their work on the external appearance and health of trees, and on lumber and finished wood products, their food, preventive measures, etc.

In order to minimize the damage caused by woodpeckers proper, which are chiefly beneficial, a trial of nesting boxes especially designed for woodpeckers is recommended. "Killing the birds should be the last resort. When all is said and done, woodpeckers of this group much more than compensate for all the harm they do by devouring large numbers of the insect enemies of trees, many of which are preyed on by no other birds.

"The sapsuckers, unlike other woodpeckers, secure a considerable part of their subsistence from the tissues and juices of trees. In doing this they often destroy so much of the cambium or growing layer that the trees are weakened and disfigured or even killed. Further, the wood of many of the trees they attack is so stained and distorted during the healing process that its value for lumber is impaired or destroyed. The loss from this cause in the United States is more than one and a quarter million dollars annually. Sapsuckers do not prey upon any especially destructive insects and do comparatively little to offset the damage they inflict. Hence the yellow-bellied sapsucker *Sphyrapicus varius*

and its western variety *S. varius nuchalis*, the red-breasted sapsucker *S. ruber* and its northern form *S. ruber notkensis* must be included in the class of injurious species, the destruction of which when caught red-handed is justifiable. In certain States it may prove desirable to deny these birds the degree of protection they now enjoy. We know too little at present to decide the status of the Williamson sapsucker *S. thyroideus*.

"As there are 20 species of woodpeckers in the United States and only 2 of them are under indictment, great care should be exercised to distinguish the real offenders. When it is necessary to destroy sapsuckers, poison should be used because of the small risk to other species of birds."

The susceptibility to plague of the weasel, the chipmunk, and the pocket gopher, G. W. McCoy (*Jour. Infect. Diseases, 8 (1911), No. 1, pp. 42–46*).—The experiments reported "indicate that the weasel (*Putorius xanthogenys*) and the chipmunk (*Callospermophilus* [*Citellus*] *chrysodeirus*) are quite susceptible to plague infection. As compared with control animals, the susceptibility of the gopher (*Thomomys bottæ*) is rather slight. This agrees with the results of previous experiments."

Fish and game laws of Massachusetts, 1911 (*Boston, 1911, pp. X+144*).—A pocket guide to the fish and game laws of Massachusetts.

Game and fish laws and laws relating to destruction of noxious animals [in Michigan], F. C. Martindale (*Lansing, Mich., 1911, pp. 211*).—A compilation of the revised laws of the State relating to the subject.

Bibliography of Canadian zoology for 1909, L. M. Lambe (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 4 (1910), Sect. IV, pp. 101–108*).—This bibliography consists of 73 titles by 39 authors.

Bibliography of Canadian entomology for the year 1909, C. J. S. Bethune (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 4 (1910), Sect. IV, pp. 109–120*).—This bibliography consists of 127 titles by 66 authors.

Thirteenth report of the state entomologist of Minnesota, F. L. Washburn (*Rpt. State Ent. Minn., 13 (1909–1910), pp. IX+184, pl. 1, figs. 87*).—This report consists largely of miscellaneous accounts of injurious insects in 1909 and 1910.

Among the more important are those relating to a wheat-head army-worm (*Heliophila diffusa*) as an enemy of timothy; work with grasshoppers; the apple leaf-hopper and the cabbage maggot in 1909; experiments with the cabbage maggot on radishes; nursery inspection, including the inspection of imported European stock; San José scale possibilities in Minnesota; the danger of introducing the gipsy and brown-tail moths into the State; household insects; further work upon the stalk borers (*Papaipema* sp.); notes on the English grain plant louse (*Macrosiphum granaria*); 4 injurious shade tree and timber pests; a cerambycid beetle infesting black and bur oaks; the Franklin cabinet for alcoholic materials; a method of rearing borers; notes on the work of the insectary and experimental garden; work with the box elder borer; and the typhoid fly on the Minnesota Iron Range, previously noted from another source (E. S. R., 25, p. 762).

Two insect pests of the United Provinces, T. B. Fletcher (*Agr. Jour. India, 6 (1911), No. 2, pp. 147–159*).—The sugar cane grasshopper and the potato moth are here dealt with.

Insect enemies of cabbage, F. Sherman, Jr. (*Bul. N. C. Dept. Agr., 32 (1911), No. 7, pp. 5–41, figs. 15*).—A summarized account of the more important insect enemies of the cabbage, together with remedial measures.

First report of the entomologist, D. L. Van Dine (*Porto Rico Prog., 1 (1911), Nos. 38, Sup., Rev. Azucarera, 1911, pt. 2, pp. 28–31; 41, Sup., Rev. Azucarera, 1911, pt. 3, pp. 36–42*).—This report covers the period from the

author's arrival in Porto Rico, September 22, 1910, to April 1, 1911; and deals with the insects affecting sugar cane in Porto Rico.

"There have been observed 4 species of insects which must be rated as doing serious injury to the cane. The one most general in its distribution, and likewise most serious in total amount of injury considering all of the estates of the island, is the moth stalk borer, *Diatræa saccharalis*. A second insect, whose distribution is also general, is the sugar-cane mealy-bug, *Pseudococcus sacchari*. Practically all fields may be considered as infested by these 2 species. The percentage of infestation varies in different localities, according to the conditions that prevail as regards varieties, methods of cultivation, climatic conditions, and the age of the cane.

"The third and most acute insect problem is the white grub injury at the roots of the cane. Several beetles of the family Scarabæidæ have been collected in the cane fields, and the injurious white grub is a species belonging to this family and is a member of the genus Lachnosterna. While the white grub is restricted somewhat in its distribution, the injury is serious in those fields affected by the ravages of the insect, and the evidence that the extent of its injury is increasing gives reason for concern.

"The fourth species referred to, namely, the mole cricket or la changa, *Scapteriscus didactylus*, is found over the entire island, but is restricted in its distribution in the cane fields both by its breeding and its feeding habits. Favorable breeding places for this insect are loose or sandy soils and the species feeds to an injurious extent only upon germinating seed and the young cane. The changa does not abound in stiff or clay soils and does not injure cane that has attained some height and the root system and stalks of which have become somewhat hardened.

"Other insects which have been observed attacking sugar cane in Porto Rico are a weevil stalk borer, *Metamasius hemipterus;* a shot-hole stalk-borer, *Xyleborus* sp.; a weevil root borer (undetermined); a scale insect, *Targionia sacchari;* grass worms (Lepidoptera—undetermined); and a plant louse, *Aphis* sp. In all, notes have been obtained on some 10 species of insects injurious to sugar cane in Porto Rico, the most acute being the injury by the white grub at the roots and the most general that of the moth stalk-borer."

Summarized accounts are given of these pests and means for their control.

Pests and diseases of the coconut palm, W. W. Froggatt (*Dept. Agr. N. S. Wales, Sci. Bul. 2, 1911, pp. 47, figs. 34*).—A general account is given of the insect and other pests and diseases of the coconut palm together with a bibliography of 34 titles.

Insect enemies of cork, J. Feytaud (*Rev. Vit., 33 (1910), Nos. 842, pp. 113–119; 845, pp. 197–202; 849, pp. 320–322; 850, pp. 346–350, figs. 10*).—A general account of the insects attacking the cork tree, cork stoppers, etc.

Thrips galls and gall thrips, H. Karny (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 21–24, pp. 556–572, figs. 30*).—The author reviews the literature relating to the subject at length. Two genera and 1 species, namely, Onychothrips and *Oncothrips tepperi*, are described as new.

Life history of Schlechtendalia chinensis (a gall-producing insect), Koehler (In *Festschrift zum 60. geburtstag Richard Hertwigs. Jena, 1910, vol. 2, pp. 239–252; abs. in Zentbl. Allg. u. Expt. Biol., 2 (1911), No. 1–2, p. 34*).—The life cycle of this aphid, which forms galls on *Rhus semialata* in Japan and central and southern China, has been followed by the author from May to November.

On the destruction of the grapevine cochylis, A. de Varenne (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 3, pp. 195, 196*).—The author reports having obtained good results in destroying the grapevine cochylis through the use of a

mixture of benzin and poppy oil 4:1. One or 2 drops placed on the small packet which contains the larva destroys it in a few seconds, no injury being caused to the grape. It is said that benzin can be replaced by gasoline and used in the same proportion.

The "looper" caterpillar pest of tea, C. B. ANTRAM (*Indian Tea Assoc., Sci. Dept. Quart. Jour., 1911, No. 1, pp. 1–7, pls. 2*).—This is an account of *Biston suppressaria*, a common jungle geometrid, which periodically occurs as a serious tea pest.

The Philippine mosquitoes, C. S. LUDLOW (*Psyche, 18 (1911), No. 4, pp. 125–133*).—The subfamilies of mosquitoes as here listed are represented in the Philippines by the following number of species: Anophelinæ, 16; Megarhininæ, 2; Culicinæ, 56; Aëdinæ, 4; Uranotaeniinæ, 7; Harpagomyinæ, 2; and Dendromyinæ, 1, a total of 88 species, of which 6 are described as new.

The house fly in its relation to public health, W. B. HERMS (*California Sta. Bul. 215, pp. 509–548, figs. 16*).—This bulletin discusses the economic importance of the house fly, methods by which it transmits disease, its life history and development, its relation to the transmission of typhoid fever, dysentery, summer diarrhea in infants, tuberculosis, Asiatic cholera, etc., objections met with in combating it, essentials of control, indoor work with the adult fly, and community-wide campaigns.

A list is given of the references cited.

The persistence of Bacillus pyocyaneus in pupæ and imagines of Musca domestica raised from larvæ experimentally infected with the bacillus, A. W. BACOT (*Parasitology, 4 (1911), No. 1, pp. 68–73*).—"Pupæ and imagines of *M. domestica* bred from larvæ infected with *P. pyocyaneus* under conditions which exclude the chance of reinfection in the pupal or imaginal period undoubtedly remain infected with the bacillus. In the imago the infection is maximal at emergence and then diminishes suddenly. The possibility of a dangerously pathogenic micro-organism being taken up by the larva and subsequently distributed by the fly is one which deserves serious consideration."

Upon the inoculation of materia morbi through the human skin by flea bites, C. WALKER (*Jour. Hyg. [Cambridge], 11 (1911), No. 2, pp. 290–300*).—"When fleas bit through films of tuberculin, vaccine lymph, and Staphylococcus emulsion lying upon the human skin, no inoculation was observed in 188 instances out of 195. In 6 of the experiments with tuberculin, inoculation followed, which possibly was not due to the flea bites. Controls gave positive results. When the same materials were rubbed over recent flea bites, no inoculations followed. Controls were positive. A very minute dose of tuberculin, such as might be conveyed by a flea's proboscis, will produce a recognisable reaction in a susceptible person."

The bearing of the results on the question of plague transmission is discussed. A bibliography of 21 titles is appended.

An enemy of the pear (Agrilus sinuatus), P. PASSY (*Rev. Hort. [Paris], 82 (1910), No. 17, pp. 405–407, figs. 3*).—The larva of this buprestid beetle is the source of considerable injury through boring in the branches.

Papers on deciduous fruit insects and insecticides.—**The California peach borer (Sanninoidea opalescens)**, D. MOULTON (*U. S. Dept. Agr., Bur. Ent. Bul. 97, pt. 4, pp. IV+65–89, pls. 3, fig. 1*).—This paper discusses the present knowledge of the California peach borer, its life history, distribution, food plants, parasites, and best known artificial measures of control, as based largely on investigations conducted since the summer of 1907.

This borer has been known to entomologists since 1881, when it was described from specimens collected in Nevada and Colorado. While it has been a menace to fruit growing in the Santa Clara Valley since the very beginning

of the fruit-growing industry, it is considered a serious pest only in limited areas in the San Francisco Bay district. Peach and apricot stocks are most susceptible to attack; the almond, cherry, apple, and native plums are less so; and the wild plum, known as the Myrobalan or cherry plum (*Prunus cerasifera*), is almost entirely exempt except when a tree has been weakened by some cause, such as lack of water or cultivation or when it has been partly killed by "gophers" or other rodents. Almond stocks are more or less resistant if planted in soils suitable to their growth.

Borers appear to attack trees more readily when they are planted in soils of a light, sandy, or gravelly texture. The author does not believe that newly hatched larvæ can reach the lower crowns or roots more easily in light than in the heavy soils of loam or clay; it appears rather, that the trees themselves are not so strong and are therefore not so resistant.

Life-history studies and investigations of methods of control, here reported in detail, are summarized as follows: "Adult moths are flying from June to and including September, and are present in maximum numbers during July and August. As they place their eggs immediately after emerging, the period of oviposition conforms with that of the flight of the moths. The egg stage lasts about 2 weeks, so that the period when the newly hatched larvæ are entering the tree is about from the middle of June to the middle of October. The period when they are entering in maximum numbers is from the middle of July to the middle of September. Any repellent or protective wash, therefore, should be applied before the middle of June. Worming should be practiced during the winter or early spring months, and it is very important that only sharp tools be used. The bark should be cut and not broken from the tree, and so far as possible only dead bark should be cut away. The most effective wash that can be used in conjunction with the worming method is considered to be the lime-crude oil formula No. 1. Heavy crude oil is thought to be repellent to the borer moth and acts to draw many of the worms out, but it is extremely injurious to some trees. It is apparently safe when combined with lime. Such preparations as residuum oil, gas tar, or asphaltum can be applied directly to the bark of the tree with only a little danger, but common practice has demonstrated that a combination with lime is almost as efficient and far safer than the crude oil alone." The lime-crude oil mixture is made as follows: Place about 50 lbs. of rock lime in a barrel and slake with 10 or 15 gal. of warm water; while the lime is boiling, slowly pour in 6 or 8 gal. of heavy crude oil and stir thoroughly. Add enough water to make the whole a heavy paste. It should be applied immediately with a heavy brush.

A list of 21 references is appended.

Cotton leaf-worm, and how to control it, P. HAYHURST (*Farm and Ranch, 30 (1911), No. 40, p. 11*).—This pest is reported to have been unusually abundant in Arkansas in 1911, causing the greatest injury in the eastern half of the State, particularly in sections along the Arkansas River from Russellville and southward. It even occurred in destructive numbers in Randolph and Clay counties in the extreme northeast.

Bee keeping in Porto Rico, W. V. TOWER (*Porto Rico Sta. Circ. 13, pp. 31, fig. 1*).—The author states that at the present time the honey industry of Porto Rico is in its infancy, there being but few apiaries on the island; these are largely located in the mountainous district of Ponce and in Mayaguez. "The northern, western, eastern, and interior portions of the island are exceptionally well adapted to the bee industry, while the south side is not considered so good on account of the scarcity of rain during all seasons of the year. The bees at the experiment station have never had to be fed during the winter months of the year. This year 2 hives of Italian bees have been weighed

morning and evening, one from December 13 until February 13, showing an increase in weight of 55 lbs., while the second showed an increase of 49 lbs. from December 22 to February 12. This was during the driest months of the year. . . .

"The coffee planters particularly have become interested in the raising of bees, not only for the honey but because bees are very useful in pollenizing coffee in seasons when there is a great amount of rain during bloom. The pollen in the coffee is carried by the winds from flower to flower, but, if there is much rain, very little bloom is set as only the dry pollen is carried by wind; during rainy periods the bees visit the flowers and distribute the pollen in their honey gathering. Coffee plantations also afford excellent fields for bees to work in as honey is obtained from the coffee shade as well as from the coffee itself."

In this circular the apparatus required for bee keeping is described and directions given for the handling of bees and honey, together with brief accounts of the principal honey plants and insect pests and diseases. It is stated that bee moths are found on the island but only attack weakened colonies.

Observations on the parasitism of Isaria farinosa, with special reference to the larch sawfly (Nematus erichsonii), H. T. Güssow (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 4 (1910), Sect. IV, pp. 95–99*).—The experiments here reported show that this fungus (*I. farinosa*) is truly parasitic on larch sawfly cocoons.

"The fungus *I. farinosa* is capable of vegetating saprophytically for a considerable length of time, provided sufficient moisture is available. The conditions under which this mode of life was observed were close to natural conditions. Owing to this saprophytic mode of life there remains little doubt that the pupating larvæ of the larch sawfly infect themselves when taking to the ground for pupation."

Experiments conducted confirm other observations in indicating that the disease may be artificially introduced after the cocoon has been spun.

Descriptions of new Hymenoptera, J. C. Crawford (*Proc. U. S. Nat. Mus., 39 (1911), pp. 617–623, figs. 3*).—This paper presents descriptions of new parasites, together with 2 new species of bees. The parasites described as new are *Trichomalus apanteloctenus*, reared from an Apanteles on *Naraga diffusa* in Japan; *Dipachystigma cushmani*, which is the type of a new genus, bred from *Stephanoderes* sp. at Tallulah, La.; *Winnemana argei*, which represents a new genus, reared from the eggs of *Arge* sp. at Plummers Island, Md.; *Euplectrus fukaii*, reared from *N. diffusa* in Japan; *E. kocbelei* from Japan, host unknown; *E. kuwanæ*, bred from *Parnara guttatus* in Japan; *Elachertus hyphantriæ*, reared from *Hyphantria cunea* at Cuero, Tex.; and *Cratotechus hoplitis* from Japan, host not given. The author also records *Pleurotropis atamiensis* as reared in Japan from *N. diffusa* and probably a secondary parasite on *Euplectrus fukaii*, and *Trichogramma japonicum* as reared from the eggs of *Chilo simplex* in Japan.

Japanese sawflies in the collection of the United States National Museum, S. A. Rohwer (*Proc. U. S. Nat. Mus., 39 (1911), pp. 99–120*).—Four genera, 1 subgenus, 24 species, and 2 subspecies are here described as new.

On the Hymenoptera of the Georgetown Museum, British Guiana, P. Cameron (*Timehri, Brit. Guiana, n. ser., 1 (1911), No. 2, pp. 153–186*).—This paper includes descriptions of numerous new species of parasitic Hymenoptera of the families Ichneumonidæ, Pimplidæ, and Ophionidæ.

Tick control in relation to the Rocky Mountain spotted fever, R. A. Cooley (*Montana Sta. Bul. 85, pp. 29, fig. 1*).—This bulletin reports investigations conducted during the past 2 years by the Montana Station in cooperation with

the Bureau of Entomology of this Department. The history of the occurrence of this disease, investigations relating to its transmission by ticks, and previous knowledge of the life history and host relations of *Dermacentor venustus* are first discussed, together with an experiment which shows that unengorged adult ticks collected in the district in which the disease obtains may convey the infection.

On the 717 small wild animals examined 4,595 ticks were found, of which a large proportion were in immature stages and all but 1,446 belonged to the genus Dermacentor. Six species of ticks were found to occur in the Bitter Root Valley, which in the probable order of abundance as indicated by observations are *D. venustus*, *D. albipictus*, *Ixodes texanus*, *Hæmaphysalis leporis-palustris*, *I. kingi*, and *I. angustus*. "The adults of *D. venustus* are engorged in the valley almost entirely on domestic animals, principally horses and cattle. Sheep and dogs support them to a very much less extent. It is apparent that on rare occasions such animals as the bear, coyote, and deer may drop engorged adults in the valley, but it is belived that the numbers so deposited have very little influence on tick abundance in the valley. . . . In the neighboring mountains 3 mountain goats (*Oreamnos montanus*) were shot and examined on 'goat rocks' above Rock Creek and Lake Como and some 200 adults of *D. venustus* were found on them, together with large numbers of *D. albipictus*. Mountain goats do not leave the rocks and descend into the valley and can not act as carriers of ticks into the valley. None of the immature stages of *D. venustus* were taken from any of the domestic animals but they were found in great abundance and apparently without much discrimination on a wide variety of small mammals. . . . Considering the relative abundance of the various hosts of the early stages it can be stated beyond a question that by far the greater part of the larvæ and nymphs feed on the Columbian ground squirrel, the pine squirrel (*Sciurus hudsonicus richardsoni*), and the yellow-bellied chipmunk. They are common, however, on a large number of other small mammals, including the woodchuck, rock squirrel, wood rat, and cottontail rabbit (*Sylvilagus nuttalli*)." Nymphs and adults of *D. albipictus* were found in abundance on horses during the fall and winter months but neither adults nor nymphs of *D. venustus* were discovered. It is thought that frequent reports of the occurrence of spotted-fever ticks on horses during the fall and winter months are based on the presence of *D. albipictus*, the nymphs and adults of which apparently feed only during the fall, winter, and spring and which remain on the host for their nymphal molt. It is clearly indicated that the presence of the spotted-fever tick in abundance is dependent upon the joint occurrence of a sufficient number of rodents and of domestic animals, principally horses and cows.

Observations made in the early spring indicate that ground squirrels, chipmunks, and pine squirrels come out of their winter nests free of ticks and that the nymphs with which they are later found infested are picked up in the regular way. Nymphs continued to be abundant until the latter part of June when there was a gradual reduction in the number although scattering individuals were found up to September 8. "It now seems clear that 2 years instead of 1 are required for the life cycle of this tick. It is believed that the winter is passed as adults and as nymphs and that both become active and feed in the spring and early summer, the former laying eggs that hatch into seeds which feed and develop into nymphs by midsummer, and the latter maturing adults by about the same time or later, neither showing a strong inclination to feed during the first summer. It is not impossible that some of the newly-developed nymphs and adults do feed during the first year." It is stated that for the adult a longevity period of 353 days has been observed in the laboratory.

Adults that molt in August may live over until the middle of the following summer.

As the first step toward the elimination of the tick and spotted fever, attempts should be made to keep horses, mules, cows, sheep, and dogs free from ticks in order to prevent the adults from maturing and depositing eggs. It is believed that this is not only feasible but a sufficient protection against the Rocky Mountain spotted fever.

A catalogue of the zoocecidia of Cassel and adjacent districts, H. SCHULZ (In *Festschrift des Vereins für Naturkunde zu Cassel zur Feier seines fünfundsiebzigjährigen Bestehens. Cassel, 1911, pp. 96–104*).—There are listed 722 galls under their host plants, together with localities and dates of collection.

Papers on insects affecting stored products.—Carbon tetrachlorid as a substitute for carbon bisulphid in fumigation against insects, F. H. CHITTENDEN and C. H. POPENOE (*U. S. Dept. Agr., Bur. Ent. Bul. 96, pt. 4, pp. III+53–57*).—The authors report 6 experiments in which infested grain was fumigated with carbon tetrachlorid at strengths varying from 1½ lbs. to 10 lbs. to each 1,000 cu. ft. of space.

The results show that it is not so fatal as is carbon bisulphid, and at the rate of 28 cts. a pound it costs fully 3 or 4 times as much. In the case of purchase at retail drug stores, it probably costs on an average 2 to 3 times as much. "Considering the strength at which it is to be used, it is very obvious that this chemical, unless it can be manufactured at a much lower price, can not be as economically employed as a remedy for insects injurious to stored products in warehouses, mills, or in any other depository, but might be used for choice seeds or in office rooms and dwellings, which can be very tightly closed and where the use of inflammable materials is prohibited or is for other reasons undesirable."

Insecticide decisions (*U. S. Dept. Agr., Insecticide Decisions 2, pp. 2; 3, p. 1; 4, p. 1*).—These decisions deal, respectively, with the Scope and Purpose of Insecticide Decisions, Approval of Labels, and Filing Guaranty.

Analyses of insecticides, H. D. HASKINS and L. S. WALKER (*Massachusetts Sta. Rpt. 1910, pt. 1, p. 323*).—This is a compilation of analyses made of barium arsenate, copper arsenite, lead arsenate, laurel green, lime arsenite, nicotina, Paris green, pyrox, and tobacco liquor, in revision of work previously noted (E. S. R., 18, p. 241).

FOODS—HUMAN NUTRITION.

Preparation, manufacture, and preservation of foods, G. PELLERIN (*Préparation, Fabrication et Conservation des Denrées Alimentaires. Paris, 1911, pp. VIII+524, figs. 159*).—The author has treated in a systematic manner the origin, manufacture, preservation, and storage of the principal vegetable and animal foods, particularly with reference to French conditions and processes.

Food adulteration and sophistication and its suppression, S. KRAINIK (*L'Évolution de la Répression des Fraudes et Falsifications Alimentaires. Paris, 1911, pp. VII+233*).—A historical account of legislation for the suppression of food adulteration and a compilation of legislative enactments in France and elsewhere.

The volume contains a preface by P. Cazeneuve.

Food and hygiene, W. TIBBLES (*London, 1910, 2. ed., pp. XII+672*).—This volume contains three parts, namely, a general discussion of food and diet; a detailed account of the principal foodstuffs and their nutritive value, together with some data regarding water, air, and climate; and food and hygiene in disease.

The author states that in this, the second edition, additions have been made, particularly discussions of sour milk, whey, lacto-vegetarianism, and other modes of dietetic treatment.

The encyclopædia of practical cookery, edited by T. F. GARRETT ET AL. (*London, [1898], vols. 1, pp. IV+514, pls. 24, figs. 634; 2, pp. 515–1006, pls. 20, figs. 608; 3, pp. 432, pls. 16, figs. 549; 4, pp. 433–892, pls. 17, figs. 539*).—Utensils, kitchen equipment, the preparation and service of foods, and other related matters are included, the material being arranged alphabetically in encyclopedic form. Recipes for the preparation of foods make up the bulk of the material and include dishes usually prepared by professional cooks as well as simpler dishes.

The science of foods, V. AYER (*Nat. Food Mag., 30 (1911), Nos. 2, pp. 125–129, charts 4; 3, pp. 212–216, charts 4; 4, pp. 300–304, charts 4; 5, pp. 401–403, chart 1; 6, pp. 522–526*).—The author has reproduced a number of the colored food charts recently published by this Office (E. S. R., 24, p. 67) and has accompanied them by some general discussion of nutrition topics.

Some post-mortem alterations of meat, J. B. BUXTON (*Jour. Roy. Inst. Pub. Health, 19 (1911), No. 8, pp. 460–469*).—A useful summary of data regarding bacterial changes, preservation, and similar topics.

Meat poisoning—its nature, causation, and prevention, E. J. MCWEENEY (*Jour. Meat and Milk Hyg., 1 (1911), Nos. 1, pp. 1–10; 2, pp. 65–71; 3, pp. 129–137; 4, pp. 192–197*).—A summary and digest of data regarding poisoning sometimes caused by meat and other foods, both animal and vegetable, due to the typho-coli group of micro-organisms, the group of putrefactive aerobes (Proteus, etc.), and the obligate anaerobes (*Bacillus botulinus*).

Spoiled canned fish, O. SAMMET (*Hyg. Rundschau, 21 (1911), No. 18, pp. 1013–1017*).—The author's conclusion is that in the case of canned fish "swells" should never be used as food, even though the can contents be of normal appearance and odor. He notes that while the flora of such canned goods usually consists of harmless micro-organisms, yet bacteria are occasionally isolated which are very injurious to health.

Tin salts in canned foods of low acid content, with special reference to canned shrimp, W. D. BIGELOW and R. F. BACON (*U. S. Dept. Agr., Bur. Chem. Circ. 79, pp. 6; Jour. Indus. and Engin. Chem., 3 (1911), No. 11, pp. 832–834*).—Since it is now recognized that several varieties of fish and a number of vegetables, though almost without acidity, have a marked solvent action upon tin, the matter was studied with a variety of canned foods particularly with shrimps. The examination of a considerable number of canned goods about 6 months old showed that the tin per 100 mg. of acetic acid varied from 1.1 mg. with plums to 93.3 mg. with salt fish, being generally higher with salt fish, beets, corn, pumpkins, Lima beans, string beans, and peas than with fruits. Similar results were obtained in a series of analyses made with canned goods of unknown origin but at least 6 months old.

In the case of shrimps it is recognized by packers that they contain some corrosive substance which interferes with their handling and preservation. It has also been pointed out that the substance seems to disappear when the shrimps are preserved with ice. The canned shrimps studied were specially packed under known conditions. A volatile alkaline substance was isolated, apparently monomethylamin, which attacks tin quite markedly and also attacks the skin of the hands. As shown by a test, the substance isolated from shrimps, made up to such a volume that it was a deci-normal alkali, dissolved 6 mg. each from two tin plates 2 by 3 in., when boiled for 1 hour. Another portion of the solution neutralized with hydrochloric acid dissolved 5.8 mg. from each plate, and a tenth-normal solution of methylamin treated in the same way

dissolved 5.7 mg. from each plate. Other acids, amins, and amino acids, including asparagin, aspartic acid, creatin, leucin, etc., were tested in a similar way and all showed a considerable solvent action.

"Asparagin has been found in asparagus, several vetches, beets, beans, and sometimes in peas. Although asparagin is formed especially during the germination of these products, it is also present in the unripe vegetables. Among the vegetables which are recognized as strongly attacking tin containers are asparagus, spinach, string beans, and pumpkin." The total volatile alkali was accordingly determined in canned samples of these substances. "It is evident that the volatile alkalis and amino acids which occur in these vegetables probably have an effect on the tin container analogous to that of the methylamin found in shrimp," and "it is suggested that these volatile alkalis and amino acids are responsible to a great degree, if not entirely, for the solvent action on tin exerted by foods of very low acidity."

Some experiments upon the removal of oysters from polluted to unpolluted waters, E. B. PHELPS (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 5, pp. 305–308*).—From experimental studies the author concludes that "within 4 days, and possibly within a shorter period of time, a healthy oyster transplanted from polluted to clean waters will rid itself of the evidences of pollution, and we may justly argue from this that the sewage material which is always associated with *Bacillus coli*, and of which the latter is taken as an index, has also been eliminated."

In further tests "such very rapid improvement was shown within 2 days that there could be no reasonable doubt as to the efficacy of very short periods of storage in clean water."

The lipoids in egg yolk, C. SERONO and A. PALOZZI (*Rend. Soc. Chim. Ital., 2. ser., 3 (1911), No. 8, pp. 200–203*).—Maximum and minimum values are reported for the oil, lecithin, palmitin, olein, and lutein of egg yolk.

The effect of certain vegetable proteids on wheat gluten, B. VON FENYVESSY (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 11, pp. 658–662*).—When wheat gliadin was added to wheat flour it entered the gluten quantitatively, the total weight of the gluten and its baking quality being directly proportional to the increased gliadin content. The addition of glutenin also increased the weight of gluten but diminished or destroyed its baking quality.

It was found that rye gliadin could replace wheat gliadin in such gluten formation. The author considers that the failure of rye flour to form gluten is not attributable, at least wholly, to a deficiency of glutenin, but to the fact that it contains substances which prevent the union of the gluten constituents. Hordein when added to wheat flour increased the total amount of gluten but lowered the baking quality. The addition of zein resulted in a horn-like mass which could be pulverized with difficulty and which expanded scarcely at all in the dough. It appears, therefore, that zein does not affect the baking quality of wheat gluten.

Apparently, of the substances under consideration wheat and rye gliadin only can unite with glutenin to form gluten with characteristic properties. The rôle played by glutenin does not seem to be specific, since denatured protein, kaolin, talc, and perhaps other materials, as well as hordein when pulverized and added to wheat flour, are taken up by the gluten and destroy its baking quality. When heated with water, gliadin is transformed into a substance which influences the gluten in the same way as glutenin.

The value of hard winter wheat flour for bread making, L. A. FITZ (*Bakers' Helper, 25 (1911), No. 294, pp. 1035, 1036, figs. 3; Southwest. Grain and Flour Jour., 10 (1911), No. 8, p. 16, fig. 1*).—In this discussion some data from baking tests with different kinds of wheat are summarized.

Hard winter wheat flour for bread making, J. A. WILSON (*Bakers' Helper, 25 (1911), No. 294, pp. 1039–1042, figs. 4; Southwest. Grain and Flour Jour., 10 (1911), No. 8, pp. 16, 17, fig. 1*).—Data regarding bread making tests of spring patent and winter patent flour by the straight-dough method and the long-fermentation method are summarized in this discussion of hard winter wheat flour.

A peculiar deterioration of flour, H. KÜHL (*Pharm. Zentralhalle, 52 (1911), No. 24, pp. 639–641*).—Butyric-acid-forming bacteria were identified in spoiled flour exhibiting specific characteristics.

Soy bean cookery, J. RUHRAH (*Med. Rec. [N. Y.], 80 (1911), No. 13, pp. 626, 627*).—Supplementing an earlier paper (E. S. R., 23, p. 468), information regarding the composition and characteristics of soy beans is summarized and recipes are given for preparing a considerable number of soy bean dishes.

Canned corn, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 226, pp. 14*).—The results are reported of the examination of 146 samples of canned corn purchased in Canada. Decided amounts of acid sulphite were found in 46 samples, and traces in 27 others. Saccharin (or other nonsugar sweetener) was present in 29 samples.

Food value of dried Surinam bananas, J. E. Q. BOSZ (*Indische Mercuur, 33 (1910), No. 35, pp. 695, 696*).—Analyses are reported and discussed in comparison with other similar data for bananas and figs.

Preservation of fruit juices with fluoric acid (*Deut. Essigindus., 15 (1911), Nos. 15, pp. 114, 115; 16, pp. 122, 123; 17, pp. 129, 130*).—In this general discussion some analytical data are summarized.

An investigation of certain substances used in coloring foods, S. RIDEAL (*Lancet [London], 1911, I, Nos. 23, pp. 1597–1601; 24, pp. 1656–1659*).—Anilin colors known commercially as egg yellow, lemon yellow, and annatto substitute, and an extract made from the fruit annatto, were studied with human subjects in health and also by methods of artificial digestion.

The tests with men, according to the author, "show that egg yellow, lemon yellow, and annatto substitute when taken internally cause no physiological disturbances and are therefore harmless in the quantities used for coloring foodstuffs, since in a period of 5 days sufficient egg yellow was administered to color more than half a ton of custard, sufficient lemon yellow to color 3,000 gal. of lemonade, and sufficient annatto substitute to color more than 12½ cwt. of cheese. It does not appear that any harmful decomposition products are produced, otherwise symptoms depending on these products would have occurred in the subjects.

"It was not possible to carry this investigation far enough completely to determine in what way the system disposes of the coloring matter. That much passed unchanged into the feces, that a small quantity of unchanged dye and some reduction products were eliminated by the kidneys was proved, but to make the evidence in this respect more complete would require the research to be based upon different lines from those adopted for determining whether the substancs were toxic or not.

"The experiments on (natural) annatto show that a considerable quantity of the coloring matter is absorbed and exists as such in the blood, from which it is capable of being transferred at least to the skin and probably to many other tissues of the body. No apparent harm, however, followed the administration of large quantities for short periods."

According to the author, in the great majority of the artificial digestion experiments the dyes under consideration "produced no interference with the various digestive processes, the substances employed in the experiments being arrowroot, maize, fibrin, white of egg, bread, and casein."

The purity of foods and drugs, A. R. TANKARD (*Brit. Food Jour., 13 (1911), No. 151, pp. 121–129*).—In an address delivered before the Hull Pharmacists' Association the author discusses various aspects of the subject and refers briefly to the results of his analytical work with so-called "standard bread," bleached flour, and other materials.

Standards of purity for food products (*Tallahassee, Fla.: Dept. Agr., 1911, pp. 35*).—The standards adopted under the state pure food law are given.

Rules and regulations for the enforcement of the pure food and drugs law, approved June 5, 1911 (*Tallahassee, Fla.: Dept. Agr., 1911, pp. 26*).—A summary of legislative enactments.

New series of notices of adulterations or misbranding under section 10 of the Kentucky food and drugs act, approved March 13, 1908 (*Kentucky Sta. Food and Drug Bul., 1911, Cases 5001–5117, pp. 46, pl. 1*).—A report of work carried on under the state pure food law, with a record of cases Nos. 5001–5117.

[Pure food topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Buls. 31, pp. 311–316, 317, 318; 32, pp. 319–334; 33, pp. 335–350, figs. 2; 34, pp. 351–366; 35, pp. 367–393*).—Data and discussions are included regarding a number of pure food topics, particularly with reference to conditions in North Dakota, and information given regarding the inspection of bakeries, groceries, slaughterhouses, and meat markets, score cards being used. The results are also given of the examination of a number of samples of food products, waters, drugs, and alcoholic beverages.

Biennial report of the state food chemist, W. M. ALLEN (*Bien. Rpt. Comr. Agr. N. C., 1909–10, pp. 52–56*).—According to the summary of data presented, out of a total of 1,924 samples of foods, condiments, and beverages examined, 17.77 per cent were adulterated or misbranded.

[Food and drug inspection], R. W. DUNLAP (*Ann. Rpt. Ohio Dairy and Food Comr., 25 (1910), pp. 90*).—Information is summarized regarding the examination of miscellaneous samples of food and drugs, and in general regarding the work of the state dairy and food commission.

Regulating food commerce in Spain (*Veröffentl. K. Gsndhtsamt., 35 (1911), No. 15, pp. 359–367; Ztschr. Öffentl. Chem., 17 (1911), Nos. 8, pp. 154–160; 9, pp. 174–180; 10, pp. 198–200*).—The regulations to prevent food adulteration which have been adopted in Spain are given.

Respiratory metabolism of infants, A. SCHLOSSMANN (*Deut. Med. Wchnschr., 37 (1911), No. 36, pp. 1633–1635*).—From the data summarized the general conclusion is drawn that maintenance metabolism and metabolism at rest, on a uniform diet, are constant and dependent upon body surface, and when computed on this basis are the same for infants of different ages and for adults.

Formation and cleavage of protein in the human body, T. PANZER (*Schr. Ver. Naturw. Kenntnisse Wien, 51 (1910–11), pp. 111–140*).—A useful summary of investigations on this subject.

Nuclein metabolism, STEPHAN (*Berlin. Klin. Wchnschr., 48 (1911), No. 19, pp. 861, 862; Med. Rec. [N. Y.], 80 (1911), No. 7, p. 331*).—This paper and the discussion which follows it bring together the theoretical conclusions drawn from recent investigations.

The action of certain sulphur compounds on metabolism and excretion, C. O. JONES (*Bio-Chem. Jour., 5 (1911), No. 10, pp. 427–441*).—Experiments in which the following conclusions were drawn were made with rabbits, the sulphur compounds being administered hypodermically. Autolysis experiments were also carried on.

"Sulphates, hyposulphites, sulphites, and sulphids interfere with oxidation processes in the cells, sulphates in large amount by preventing exchange between

the blood stream and the cells. This action disappears when the amount of sulphate is reduced, and there then follows a stage of stimulation, the sulphate causing a very marked diuresis, sometimes accompanied by the excretion of much more sulphates than were injected into the body together with the amount found in the food. Sulphate also has a marked irritant action on the kidney cells when more than a small amount is present. Purgation is not usual; during the second day after an injection an increased quantity of sulphates is excreted in the feces, but the following day the amount has again fallen to normal. Calcium carbonate, phosphate, and oxalate are found in the urine after large doses, and are probably products of incomplete oxidation, the oxidation having been interfered with by the high concentration in the blood preventing interchange with the cells.

"Hyposulphites act very much like sulphates, being very quickly reduced in the body to sulphate.

"Sulphites and sulphids are somewhat similar in their action, and this action depends on the amount of oxidizing ferments found in the animal. In some animals they are at once oxidized, and the sulphates produced give the typical picture described above. If the animal is deficient in oxidizing ferments the sulphite appears to unite with and neutralize the action of the tissue ferments. Sulphid appears to unite to some constituent of the cell itself, and both interfere, according to the quantity, with tissue changes, and if in sufficient amount they stop all metabolic changes and the animal dies of failure of respiration and circulation, with perhaps convulsions. If the amount is sublethal, it is attacked by the oxidizing ferments, and gradually got rid of as sulphate. In the case of sulphite, when the toxic dose is large the sulphate gives the diuretic action, but in the case of sulphid the amount of sulphate is so minute that little or no diuresis is often to be seen. Both sulphite and sulphid interfere with metabolic changes, especially with oxidation processes, causing the excretion of calcium especially, but also of other insoluble salts in the form of carbonate, phosphate, and oxalate. There is also an intense renal irritation as the result of both these salts. The irritation caused by all these three sulphur compounds raises the possibility as to whether they may not, in part at least, be the cause of chronic nephritis and cirrhosis of the liver, both frequently ascribed to malted drinks, which are known to contain large amounts of sulphates. When it is also considered that these people usually have insoluble salts in their urine, such as are described in this paper, and as such results are not common after drinks which are free from sulphates, it is possible that the sulphates, and not the alcohol, may be the cause of their condition."

Studies in nutrition.—An investigation of the influence of saltpeter on the nutrition and health of man with reference to its occurrence in cured meats: III, The experimental data of the bio-chemical investigations, H. S. GRINDLEY ET AL. (*Univ. Ill., 1911, pp. VIII+442*).—This volume of studies in nutrition carried on at the University of Illinois reports experimental data of the extended investigations of the influence on the nutrition and health of man of saltpeter as it occurs in cured meats. The methods of analysis followed are described and the kind and amounts of food eaten, as well as the chemical composition of food and excretory products, are recorded. The fat balance and coefficient of digestibility of fat are recorded, as are also data regarding the volume, specific gravity, acidity, and chemical composition of the urine. The recorded data are not discussed with reference to their bearing on the general question under consideration, the volume as a whole being one of a series. The records of food consumption constitute a very extended dietary study or feeding experiment under carefully controlled conditions.

The action of drugs under pathological conditions, W. SALANT (*U. S. Dept. Agr., Bur. Chem. Circ. 81, pp. 16*).—This paper lays particular stress on the fact that a drug when administered to a normal subject will act differently than when used under pathological conditions. The phases considered in this connection are the behavior of drugs as to organs of internal secretion, febrile conditions, variations in body temperatures experimentally induced, starvation or a restricted diet, chronic alcoholism, fatigue, and the circulatory organs. The data reported are accompanied by an extensive review and bibliography of the literature, which includes some of the author's own work.

ANIMAL PRODUCTION.

American Society of Animal Nutrition (*Amer. Soc. Anim. Nutrition Proc. 1910, pp. 46*).—This contains extracts from the minutes of the annual meeting held November, 1910; a scheme for cooperative investigations upon the optimum protein supply of fattening cattle; a report of the committee on terminology, which consists of a list of terms used in reporting slaughtering tests; the address of President H. P. Armsby, on the nutritive value of the nonprotein in feeding stuffs, which contains similar data to that in the article noted below, and a paper by P. F. Trowbridge, on the resorption of fat, which contains further details concerning work previously noted (E. S. R., 25, p. 273).

The nutritive value of the nonprotein of feeding stuffs, H. P. ARMSBY (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 139, pp. 49*).—This gives a critical review of the literature of investigations on the value of the nonprotein nitrogenous substances in the ration, with numerous references, which the author has summarized as follows:

"Amino acids and amids, which ordinarily constitute the larger part of the nonprotein of vegetable substances, are katabolized in the animal body, their nitrogen appearing in the urine.

"In carnivora and omnivora neither the single substances of the foregoing groups nor the mixtures of them contained in plant extracts have been shown to be capable of performing the functions of protein.

"In ruminants a conversion of nonprotein into protein appears to be affected by the micro-organisms of the digestive tract. The extent of this conversion appears to be relatively greater in the case of ammonium salts and asparagin than in that of vegetable extracts.

"The protein formed thus from nonprotein seems to be digested subsequently. The apparent formation of indigestible protein observed by some investigators appears to be due to an increase in the metabolic products contained in the feces, caused by a specific action of the extracts upon the digestive tract.

"By means of its conversion into bacterial protein, the nonprotein of feeds may serve indirectly for maintenance and also as a source of protein for milk, and probably for growth, in rations deficient in protein.

"The limiting factor in the indirect utilization of the nonprotein of the feed appears to be the extent to which it can be converted into protein in the digestive tract rather than any inferior nutritive value of the protein thus formed as compared with that originally present in the feed.

"The nonproteins are much inferior to the proteins in nutritive value for productive feeding. The prime effect of a substitution of nonproteins for proteins in the ration is a very marked falling off in the production. The indirect utilization of nonprotein simply serves to prevent this decrease from becoming as great as it otherwise would, and so in case of need to compensate partially for a deficiency of protein. On the other hand, with a reasonable supply of di-

gestible protein the addition of nonprotein fails to increase the production of nitrogenous matter.

"Recent experiments raise the question of the possibility of a direct utilization of ammonia as a source of protein by the higher animals."

It is stated that, while it appears that nonprotein may be of equal value with protein for the maintenance of protein tissues of the body, it seems safe to consider that ordinarily not enough of it is converted into protein to make it of material significance for the production of milk protein and probably, therefore, of protein tissue. Because of the complication of calculations which would be brought about in the case of ruminants by introducing the nonprotein, it is suggested that it is wisest to continue, for the present, to use ordinarily the digestible true protein as the basis of computing rations. To make the computation more accurate in the case of ruminants, however, a method is outlined which consists in formulating separately the protein requirement for maintenance and for productive purposes, computing a ration which shall supply sufficient true protein to meet the requirement for production, and then computing whether this ration contains sufficient nonprotein to cover the maintenance requirement.

Alpine hays in the vales of Lanzo, E. RUATA (*Ann. R. Acad. Agr. Torino, 53 (1910), pp. 445–447*).—Chemical analyses are reported of samples of hay taken from different localities in the Piedmont. The relative proportion of grasses and other plants in each sample was determined and their feeding value is discussed.

The feeding value of apple pomace, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 84–86*).—A discussion of the feeding value of apple pomace, and a brief report of a feeding trial with milch cows in which it was found that from 15 to 30 lbs. per day per cow could be fed with satisfactory results.

"In one case 2 cows were fed alternately, 4 weeks at a time, on grain and hay, and on grain, hay and pomace; 25 lbs. of pomace were compared with 5 lbs. of hay. During the pomace period the animals produced 1,153 lbs. of milk, and gained 24 lbs. in live weight; during the hay period, 1,138 lbs. of milk, and lost 6 lbs. in weight. On this basis 5 lbs. of pomace were more than equivalent to 1 lb. of hay. Judging from this feeding test, and from the composition and digestibility of the pomace, it seems probable that 4 lbs., when fed in what is termed a 'balanced ration,' would be equal in feeding value to 1 lb. of good cow hay."

Distillery and brewery by-products, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 72–83*).—A discussion of the feeding value of distillers' dried grains, brewers' dried grains, and malt sprouts. Their chemical composition is given and sample rations containing these ingredients are suggested for horses, cattle, and pigs.

Commercial feeding stuffs [analyses feeding standards, summer soiling suggestions], J. L. HILLS ET AL. (*Vermont Sta. Bul. 158, pp. 175–212*).—Results are reported of analyses of 438 samples of feeding stuffs, including cotton-seed meal, linseed meal, distillers' grains, brewers' grains, malt sprouts, wheat bran, wheat middlings, provender, dried beet pulp, ground oats, alfalfa meal, and proprietary, gluten, molasses, hominy, poultry, and other mixed feeds.

The bulletin also discusses in a general way the composition of feeds, and the feeding standards of Armsby, Haecker, and the Scandinavian feed unit system. Suggestions for summer soiling are given, and there is a brief report of an experiment which indicated that cows shrank in milk much less when fed entirely on grain and soiling crops than when partially soiled.

[Composition, digestibility, and fertilizing ingredients of fodder articles], P. H. SMITH and J. B. LINDSEY (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 247–*

271).—A revision of a compilation of the composition, digestibility, and fertilizing ingredients of feeding stuffs made at the Massachusetts College and Station and its predecessors, 1868–1910, previously noted (E. S. R., 18, p. 278).

Coefficients of digestibility of American fodder articles.—Experiments made in the United States, J. B. LINDSEY and P. H. SMITH (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 273–303*).—This revision of a compilation previously noted (E. S. R., 18, p. 261) includes digestion coefficients resulting from experiments made in the United States, intended to be complete to December, 1910. A bibliography of publications of the state stations consulted in compiling these tables is appended.

Scale of points for Friesian cattle (*Agr. Jour. Union So. Africa, 1 (1911), No. 5, pp. 690, 691*).—This contains the scale of points of an ideal form of Friesian cattle, as stated in the Friesian herd book (Friesch Rundvee Stamboek). It is stated that there is no official scale for judging South African Friesian cattle, but that good judges of the breed adopt either those of the Friesian herd book or the American Holstein-Friesian herd book, placing emphasis upon particular points applicable to South African conditions.

The blue breed of the north, R. DUMONT (*Jour. Agr. Prat., n. ser., 22 (1911), No. 36, pp. 304, 305, pl. 1*).—A description of this popular dual-purpose breed of cattle of France. It is stated that the breed is the result of a cross of the native Belgian with the Durham and Hollandaise. Suggestions are given for the improvement of the breed, and it is urged that improvement be toward the milking type.

Alfalfa and corn for fattening lambs, H. H. SIMPSON (*New Mexico Sta. Bul. 79, pp. 18, figs. 7, dgm. 1*).—These experiments were undertaken to show a comparison of the cost of gain in feeding lambs varying amounts of corn in connection with alfalfa.

In 1909, 100 wether lambs were divided into 4 lots and fed a period of 73 days rations consisting of all the alfalfa wanted and different amounts of corn. The lot fed ¼ lb. shelled corn each daily made a gain of 0.24 lb. daily at a cost of 5.7 cts. per pound of gain; those fed ½ lb. shelled corn made 0.23 lb. gain at a cost of 6.6 cts. per pound gain; those fed ¾ lb. shelled corn gained 0.28 lb. at a cost of 6.3 cts. per pound; those fed 1 lb. shelled corn made a gain of 0.31 lb. at a cost of 6.6 cts. per pound; the feeds being valued at $8.50 per ton for alfalfa and $32 per ton for the corn. These results are compared with results obtained with lambs fed alfalfa, corn and Kafir corn stovers, and corn in 1901–2. (E. S. R., 16, p. 189.)

The author states that with local markets which do not make a distinction between finished and unfinished lambs it is more profitable to feed a light grain ration, especially where grains are high priced, selling the lambs just before the final finish period.

Coyote-proof inclosures in connection with range lambing grounds, J. T. JARDINE (*U. S. Dept. Agr., Forest Serv. Bul. 97, pp. 32, pls. 2, figs. 3*).—This reports a continuation of the work (E. S. R., 23, p. 575) on the advantages to be gained through the use of coyote-proof pastures in handling sheep.

A justification of the results previously reported has been obtained by a private individual who inclosed 500 acres with coyote-proof fence, and in this inclosure 1,000 ewes were lambed. With the services of only one man 100 lambs were saved for each 100 ewes. It is stated that this number would have been higher but for the fact that some animal, presumably a coyote, was fenced in the inclosure and preyed upon the lambs. Just outside this inclosure it required the services of 3 men and a pack of hounds to care for 1,000 ewes, and only 95 lambs per 100 ewes were saved. This fence, which is approximately

4 miles long, cost $1,651.46 exclusive of transportation of wire from railroad station.

The results already reported have been secured in pastures large enough to accommodate all the ewes throughout the lambing period. With the hope of meeting the more urgent need of localities so situated that the cost of placing wire on the ground and constructing a satisfactory fence is too great to justify the inclosing of an entire lambing ground, a special system of pastures on a small scale was devised and an experiment initiated in 1910. The prime object of this system of pasture was to meet the need of the shepherd in handling "doubtful" cases (those requiring individual attention) and to provide quiet and protection in small bunches for all the ewes and lambs until the lambs were 5 days old. These pastures were constructed on the Cochetopa National Forest in southern Colorado at an elevation of about 9,000 ft. The total cost of 700 rods of fence was $1,134.87, which is less than the mile rate, due to the fact that on part of the division fences only 3 barbed wires were used.

The band of sheep was made up of 1,006 grade ewes, ranging from 2 to 10 years old, and 325 yearlings. Each night the unlambed ewes were corralled near the inclosures and no more attention given them until daybreak, when they were allowed to move from the corral at will, leaving behind the ewes which had yeaned lambs during the night. The ewes and lambs were moved from one inclosure to another each day, in order to make room as near to camp as possible for the drop of the previous 24 hours, and in this way the lambs were from 5 to 7 days old when turned out to range.

Out of the 1,006 ewes 922 lambs were yeaned, of which 69 were lost. On July 3, when the lambs were marked, there was for each 100 breeding ewes an average of 84.8 lambs. This is 7.3 per cent better than one band, and 0.6 per cent better than another band lambed during the same time on an adjoining range. During this season trouble from predatory animals was very slight. Out of 25 single lambs lost in the pastures 16 choice lambs died of a disease termed by the shepherd "milk sickness," which the author attributes to hardness in and an excess of milk.

Among the advantages of this system of pastures the author mentions the increase in the percentage of lambs saved; the decrease in the amount of labor necessary; ewes and lambs in better condition at the close of the lambing period; greater degree of certainty as to the lamb crop; the elimination, to some extent, of the worry of securing labor, and the decrease in acreage of range necessary.

Feeding farm work horses, R. C. OBRECHT (*Illinois Sta. Bul. 150, pp. 433–461, figs. 9*).—In these tests 9 teams of well-bred grade geldings and 1 team of mares were used. Most of them showed evidence of Percheron blood, while others had indications of Shire or Belgian ancestry. The initial weights of each horse varied from 1,003 to 1,560 lbs.

There were 12 feeding periods of 4 weeks each. During the first 7 periods one of the horses in each team was fed timothy and the other clover; during the remaining 5 periods this ration was reversed. On Saturday nights the regular grain feed was omitted during the first year, and a 4-lb. bran mash given in its stead in order to keep the bowels in good condition. On Sunday the noon feed of grain was omitted and an extra 4 lbs. of hay was given to 3 teams. The others received their regular noon feed of grain as usual on Sundays but no additional hay. All the horses remained in good health throughout the experiment except one, which was subject to an occasional attack of colic.

There was but little difference observed in the value of clover and timothy hay when fed in conjunction with corn, oats, oil meal, and wheat bran. What

difference there was was slightly in favor of the clover. There was no observable difference in the effect of clover and timothy upon the spirits of the horses or their ability to endure hot weather. Those receiving clover had glossy hair and their bowels were looser, but not too loose to endure hard work.

There was a slight saving of grain when clover hay was chaffed and the ground grain mixed with it, but not sufficient to justify the expense. It is thought that the practice may be beneficial when a very heavy grain ration is being fed. The horse subject to colic had fewer attacks when the grain was mixed with chaffed hay than when it was fed separately.

The horses fed alfalfa and timothy ate less grain and hay and gained slightly more in weight than those fed clover and timothy, while doing the same amount of work. From 20 to 22 per cent less grain was required to maintain the weight of horses fed alfalfa than those fed timothy. Horses fed corn and alfalfa ate 22 per cent less grain and lost 6 lbs. more in weight per head in 8 weeks than those fed a mixed ration of corn, oats, wheat bran, oil meal, timothy and alfalfa, and the cost was 6 cts. less per horse per day. Horses fed ground corn and oats with wheat bran, oil meal, timothy, and alfalfa consumed 9 per cent less grain and gained 3 lbs. more in weight per head in 6 weeks than those fed whole corn and oats on a similar ration. It was thought that when the teeth of horses are good they will do well on whole grain, but that when horses are worked near the limit and it is desirable to conserve all possible energy for labor there may be economy in grinding.

Among other conclusions are the following: "The mingling of grain with chaffed timothy hay did not prove satisfactory. . . . Though too short to be conclusive these tests indicate that mature horses at hard work can be maintained quite satisfactorily for a short time, at least, on corn fed in conjunction with alfalfa hay, and at a saving in cost. . . . Farm work horses at hard labor should receive from $1\frac{1}{5}$ to $1\frac{1}{3}$ lbs. of grain, and from 1 to $1\frac{1}{4}$ lbs. of hay, per 100 lbs. of live weight per day, in order that their weight may be maintained. . . . The grain fed should be reduced one-half on idle days until 4 days have elapsed, or until they are again put to work, when it may be again increased if desirable. By following this method attacks of azoturia were prevented. The results of the experiment indicate that the general impression is correct that horses may very properly be given a more bulky ration when idle or doing light work than when at heavy work. It is believed that the practice of permitting work horses to gorge themselves with hay is all too common."

The best color for horses in the Tropics, C. E. Woodruff (*Jour. U. S. Cavalry Assoc., 22 (1911), No. 86, pp. 243–263*).—A discussion of the general principles governing the natural selection of animal colors, as it is thought that an increase in efficiency and a great financial saving will be possible by selecting the most suitably colored horses, mules, and draft animals for the Tropics.

The skin of animals which have been domesticated in the Tropics is black. As the pigment prevents possible actinic effects, the black surface radiating heat to cooling bodies, black animals are at a disadvantage if the surrounding air is hotter than they are. Hence, the black animals hide or in some other way protect themselves in the hottest part of the day, the carabao for instance suffering from thermic fever unless he is allowed to bathe frequently. Domesticated breeds originating in northwestern Europe have white skins, as they have little need of the pigment protection and the light skin conserves the body heat in a cold climate. The black animals are thus more restricted in the range of temperature than white ones, for they are less able to withstand extremes of heat or cold, thereby showing the same temperature restric-

tions as the black man. In the Tropics the black animal is more liable to "blow up," as the teamsters say.

Examples are cited to show that white-skinned animals can not survive in places where the light is excessive. The horse is not a tropical animal at all and does not thrive where it is hot unless the air is dry. Black-haired horses are never found in nature but are the product of artificial selection, and that a poor one, as they require protection in all seasons. A black skin is necessary in the Tropics, but a white, yellow, or red hair is also necessary in order to prevent rapid absorption of heat. The Filipinos prefer buckskin horses with a stripe down the back.

Other things being equal, bulk is an enormous advantage in keeping warm in cold climates, while slenderness and small size are advantages in keeping cool in hot climates. The Percheron is wholly out of place in the Tropics, and the effort to breed up big beef cattle is liable to fail. There seems to be some unknown relation between color and nervousness, for on "review" as a rule the gray troop is phlegmatic, the sorrel quiet, the bay is excitable and restless, and the blacks are the most excitable of all. Nervousness is so harmful in the heat that as a matter of selection the Arab breed has developed into a quiet, gentle, and sensible animal. The white is more trainable and is always selected for trick horses. "Some genius will some day find a cross as fit for our cavalry as the European stock is fit for foreign troopers, but it will not be a permanent type, and moreover it will be suited to only one of our innumerable climates. We cannot get a horse fit for every place."

It is pointed out that what is needed are more carefully compiled statistics of horses which died or were disabled in the various climates of the world, and including data as to the influence of age, color, where bred, and how long in the new climate before they are disabled. "Cities should furnish valuable information as to the best colors for the Tropics, as a very hot wave in the summer in Chicago, for instance, kills the least fit at the rate of 300 to 500 a day, and it is safe to predict that on investigation the dark colors will predominate."

Monograph of the Belgian draft horse, H. DE THEULOGOET (*Monographie du Cheval de Trait Belge. Brussels, 1911; abs. in Deut. Landw. Tierzucht, 15 (1911), No. 37, p. 451*).—A treatise on the origin of the domesticated horse and the varieties and characteristics of Belgian horses.

Fattening poultry, A. R. LEE (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 140, pp. 60, pls. 4, figs. 2*).—This bulletin describes methods of feeding poultry on a large commercial scale, and presents figures on the cost of such feeding. It contains complete data on the feeding of over 100,000 chickens during 1910, and partial data on the feeding of 200,000 others.

From the results of feeding 1,120 birds in batteries or crates from 6 to 14 days, it was found that in general Leghorns made much poorer gains than Plymouth Rocks, though the results were not entirely consistent. Individuals of the same breed vary greatly in their ability to put on flesh, and directions are given for the selection of birds suitable for fattening.

Practically all the special feeding in this country involves the use of milk, thus producing "milk-fed" chickens. The feeding period usually is 17 days or less. Fattening by the cramming machine has not become a common practice in this country, though some feeders have used the method successfully. In cramming the birds are fed from 7 to 14 days from the troughs, and are then crammed twice daily for from 7 to 10 days, until they begin to go off feed, when they are marketed.

In crate fattening, which is the method usually adopted in this county, from 6 to 10 chickens are placed in the crate or battery. Many large poultry feeders

have found after trying various feeds and rations that a simple ration made up of only two or three kinds of grain is the most economical. One trouble usually incident to forced feeding is feather pulling, which the author attributes to too large a proportion of corn meal, during hot weather. In such cases it is advised to reduce the proportion of corn meal and add some green feed, such as clover or alfalfa meal, and possibly a small amount of meat or blood meal. Milk is used entirely in mixing the various rations, and is considered an essential ingredient. The methods used for mixing the feeds are noted, and two types of mixing machines are described. The feed is mixed to the consistency of thick cream, and the birds, after being brought gradually to full feed, are fed all they will eat from 2 to 5 times a day at regular intervals. A bleached appearance is very characteristic of milk-fed chickens, which is attributed principally to the use of milk. For satisfying the demands for colored flesh butter color or molasses has been used. Detailed descriptions are given of 5 feeding stations and their equipment.

In figuring the cost data of the extensive feeding tests the following prices were used: Corn meal $27 per ton, low-grade wheat flour $27 per ton, oat flour $44 per ton, tallow 8 cts. per pound, buttermilk 1.5 cts. per gallon, condensed buttermilk 75 cts. per 100 lbs. The stock in experiment A was of mixed origin just as they came in from the small buyers, without sorting. About 42 per cent were Plymouth Rocks, 17 per cent Leghorns, 10 per cent consisted of several other breeds, and 31 per cent were of mixed breeding. The stock used in the other experiments were similar, but probably not so good. The birds in experiment A were fed three times daily for from 6 to 10 days, the rations consisting of 60 per cent corn meal and 40 per cent low-grade wheat flour mixed with condensed buttermilk, diluted with 2 parts of water. In experiment B the birds were fed twice daily from 6 to 15 days, rations consisting of 58 per cent corn meal, 36 per cent oat flour, and 6 per cent tallow, by weight, mixed with buttermilk.

The following table gives some of the results of these two experiments.:

Summary of crate feeding experiments with poultry.

Experiment.	Number of head.	Average weight.	Percentage of gain.			Grain per pound of gain.			Cost of labor per pound of gain.			Cost of feed per pound of gain.		
			High.	Low.	Average.	High.	Low.	Average.	High.	Low.	Average.	High.	Low.	Average.
		Lbs.	*P. ct.*	*P. ct.*	*P. ct.*	*Lbs.*	*Lbs.*	*Lbs.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
A	43,944	2.42	29.6	8.2	18.1	5.35	1.92	3.26	2.81	.88	1.40	10.37	3.71	6.45
B	61,706	2.82	57.8	4.0	18.7	8.45	1.29	3.26	5.63	1.14	2.59	19.90	3.15	7.74
B	[1]7,753	2.30	36.2	5.4	17.7	8.45	1.61	3.28	5.73	1.47	2.47	19.44	3.93	7.68
B	[2]18,864	3.61	29.3	4.0	11.3	8.19	2.27	4.18	7.30	1.47	3.41	19.90	5.22	10.01

[1] Broilers. [2] Roasters.

In another feeding experiment 113,217 birds of a little lower quality than those in experiments A and B were fed from 5 to 14 days grain rations similar to those fed in experiment A with an addition of from 6 to 12 per cent shorts, mixed with buttermilk. The average percentage of gain was 20.2, the highest average gain, 34 per cent, being made by 2,139 birds fed 11 days, and the lowest average, 11.4 per cent, by 17,277 birds fed 6 days. In another experiment in which the rations varied only slightly from those in the experiment just reported, 89,319 birds, fed from 6 to 16 days, made an average gain of 20.1 per cent. The stock in this experiment was of poorer quality than that of any of

the others, and the loss from sickness and death affected the results adversely in most of the lots.

At two of the above stations 4,704 hens were fed from 5 to 11 days. The lots were fed various mixtures of the above grains with buttermilk. In many cases diarrhea developed, which was apparently helped by the addition of low-grade flour and the scalding of the milk, and in some of the batteries by the sprinkling of ground bone in the feed. The highest average gain, 28 per cent, was made by a lot of 340 hens fed 7 days. The lowest, 0.8 per cent, was made by a lot of 340 hens fed for 8 days.

The birds were dressed and put into cold storage. The loss of weight or shrinkage in dressing (without drawing) for the different classes of birds varied as follows: Hens, 13.4 to 14.9 per cent, average 14.4 per cent; roasters, 13.7 to 16 per cent, average 14.7 per cent; springs, 9 to 14.5 per cent, average 12.1 per cent; and broilers, 14 to 14.7 per cent, average 14.3 per cent.

Suggestions are given for cleaning and spraying the batteries, and for disposing of the manure, which amounted to about half a ton daily for 10,000 chickens on feed. Appendixes are included in which are detailed tabular data of experiments A and B.

The improvement of the farm egg, H. M. LAMON and C. L. OPPERMAN (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 141, pp. 43, pls. 4, figs. 2*).—This is a continuation of the study of the factors surrounding the production and marketing of eggs (E. S. R., 20, p. 1070).

It is stated that practically all the loss due to improper handling of eggs is borne by the farmers and other egg producers, and is to a large extent easily preventable. During July, August, and September, 1910, out of 706,569 doz. eggs received by three buyers in Kansas 78.3 per cent were firsts, 10.3 per cent seconds, 1.9 checks, and 9.4 per cent rots. Accurate figures show that the total loss amounts to from 5 to 25 per cent of the whole egg crop, depending largely on weather conditions. It is thought that a large percentage of this loss can be prevented by replacing the "case-count" system of buying with the "loss-off" system.

For the purpose of encouraging the loss-off system of buying, and to inaugurate a closer and more careful examination of conditions surrounding the marketing of eggs, work was undertaken in 1910 in cooperation with buyers, the state board of health, and the Kansas Station. The buyers entered into an agreement to buy eggs on a strictly loss-off basis after July 1, 1910.

In investigating conditions the authors visited more than 100 farms during the summer. The information secured was assembled on cards, the backs of which contain a score card of the farm poultry flock, and the data obtained are tabulated and discussed in detail. In a similar manner the conditions surrounding the eggs after they leave the farmers were studied. These studies included the country store, the cash buyer, the huckster, the cooperative creamery, the handling of eggs by local freight, and the car-lot shipper.

As a result of this study suggestions are offered for the farmer, country merchant, railroad official, and car-lot shipper which, if heeded, would probably improve the quality of the egg that reaches the consumer and also diminish the loss which now falls on the farmer, merchant, and consumer.

DAIRY FARMING—DAIRYING.

Dairy cattle and milk production, C. H. ECKLES (*New York, 1911, pp. XII+342, pls. 30, figs. 24*).—This treatise on dairy husbandry, which has been prepared for the use of agricultural college students and dairy farmers, represents material gathered for presentation to classes of students and dairymen.

The author has drawn largely from his own experience and from numerous experiments conducted at the state stations. Although all phases of dairy husbandry are treated, the larger portion of the book is devoted to the following topics: The characteristics of the principal dairy breeds, judging dairy stock, management of dairy cattle, and feeding for milk production.

Report of milk tests and records, 1908–1910, T. MILBURN and R. RICHARDSON (*County Council Lancaster, Ed. Com., Agr. Dept., Farmers' Bul. 21, pp. 35*).—Records of individual herds are given in detail. Some of the conclusions are as follows:

"The heifers recorded in the different herds gave milk richer in fat and in solids-not-fat than the older animals, but the total amount of solids was larger from the latter. Too much reliance should not be placed on percentages alone, the total yield of solids must also be considered. Generally speaking, the cows recorded improved in milk yield up to the fourth calf. Taking the yearly yields, the best animals gave almost double the quantity of milk yielded by the worst animals of corresponding age. The milk of cows with a small yield is not necessarily richer in fat or total solids than that of cows with a large yield, in fact the opposite may be the case. There has been an improvement in the milk yield of the herds tested for 3 years (with one exception), the average increase being 47 gal. per herd. Concurrent with the increase in quantity there was an improvement in quality, both fat and solids-not-fat being higher than at the commencement of the tests. . . . On several occasions the mixed morning's milk of 2 herds was below the government standard of 3 per cent fat."

Cow-testing associations, W. M. SINGLETON (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 3, pp. 201–211, figs. 6*).—This is the annual summary of results of testing 4,158 cows by the cooperative societies.

Studies in milk secretion: The effect of protein upon the production and composition of milk, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1910, pt. 1, pp. 86–121*).—This report of a study of the effect of protein on the production and composition of milk is a continuation of earlier work (E. S. R., 14, p. 183).

In one test a high protein ration containing 3 lbs. of wheat bran, 5.5 lbs. of gluten feed, 10.9 lbs. of hay, and 25.7 lbs. of corn silage was fed. The other ration was practically identical, except that 4 lbs. of corn meal was substituted for a like amount of gluten feed. The high protein ration was 48.6 per cent in excess of the protein minimum, and in 63 days produced 5.9 per cent more milk than did the low protein ration, which was only 21.4 per cent in excess of the minimum.

In another test under similar conditions the average digestible protein fed daily to each cow in the high protein ration was 2.41 lbs., and the excess over that required for milk production and maintenance was 65.3 per cent. In the low protein ration the amount of protein was 1.96 lbs. daily, being an average excess of 39 per cent above the requirements. The group receiving the high protein feed produced 7.4 per cent more milk than that on the low protein ration in an experiment covering 26 days.

In a test covering 11 weeks with 12 cows by the group method, an excess of 0.54 lb. of protein or 31.3 per cent over the protein minimum produced an apparent increase of 10 per cent in milk yield. In later tests covering periods from 24 to 30 weeks with 10 cows, by the group method, those receiving the protein minimum did not shrink any more than those receiving 0.44 lb. each, or 28 per cent, protein above the minimum.

Other conclusions drawn from these tests, and those previously reported, are the following: "The group method of experimentation is best suited for conducting experiments where a relatively large number of animals—20 or more—

is available. With a less number the influence of individuality is altogether too pronounced. An excess of 30 per cent of digestible crude protein above the protein minimum (equal to 1.8 lb. of protein per day) will be productive of satisfactory results in case of cows weighing 900 lbs. and producing daily 12 qt. of 4 per cent milk. An excess of 50 per cent of digestible crude protein above the protein minimum is believed to be ample for all ordinary requirements. Protein in excess of the above suggested amounts may temporarily increase the milk yield, but it seems probable that in many cases the influence of individuality is likely to be more pronounced than the effect of the protein consumed. Under the usual conditions, varying amounts of protein appear to be without influence upon the composition of the milk."

The effect of protein upon the production and composition of milk, J. B. LINDSEY (*Massachusetts Sta. Rpt. 1910, pt. 2, pp. 87–89*).—This is a popular summary of the above.

The composition of milk, H. D. RICHMOND (*Analyst, 36 (1911), No. 425, pp. 390–392*).—The average results of an examination of 19,282 samples of milk made in 1910 were as follows: Morning milk, specific gravity 1.0322, fat 3.53, total solids 12.43 per cent; evening milk, specific gravity 1.0319, fat 3.92, and total solids 12.81 per cent. The lowest fat content occurred in May and June, and the highest in October and November. The drop in solids-not-fat so often found in July and August was scarcely noticed in 1910. The period when cows frequently yield milk below standard appeared to be extending into both April and July. As a rule genuine samples of milk containing less than 8.5 per cent of solids-not-fat should contain 0.5 per cent of nitrogen and 0.7 per cent of ash, though occasionally exceptions were found to this rule.

On the alleged increase of bacteria in milk by mechanical action, E. GUTZEIT (*Milchw. Zentbl., 7 (1911), No. 5, pp. 193–211, fig. 1*).—Contrary to the results of other observers (E. S. R., 17, p. 288) the author found that filtering, centrifuging, or stirring did not increase the bacterial content of milk above that which would naturally take place in the same length of time.

Analyses of dairy products, P. H. SMITH and J. B. LINDSEY (*Massachusetts Sta. Rpt. 1910, pt. 1, p. 272*).—A revision of a compilation of analyses of whole milk, human milk, colostrum, skim milk, buttermilk, cream, and fresh and salted butter made at the Massachusetts College and Station, 1868–1910 (E. S. R., 18, p. 278).

Experiences in the control of milk, cheese, and butter in Chemnitz in the year 1910, A. BEHRE (*Milchw. Zentbl., 7 (1911), No. 9, pp. 402–411*).—Analyses are reported of milk, butter, yoghourt, and the following varieties of cheese: Schweiz, Harz, Brie, Tilsit, Limburg, Edam, Roquefort, Camembert, Gervais, and Breakfast.

Extract from the report on the activities of the dairy laboratory at Smeinogorsk in 1910, A. NESTRELJAEW (*Milchw. Zentbl., 7 (1911), No. 5, pp. 214–233*).—The physical and chemical constants of many samples of butter are reported.

Standards for preserved milk (*Agr. Gaz. N. S. Wales, 22 (1911), No. 7, pp. 613–615*).—At a conference of condensed milk manufacturers of New South Wales the following standards were recommended: Unsweetened condensed milk, total solids 28 per cent, fat 8.5 per cent; sweetened condensed milk, total solids 31 per cent, fat 9 per cent; concentrated milk, total solids 37 per cent, fat 10 per cent.

Report to the local government board on an inquiry as to condensed milks, with special reference to their use as infants' foods, F. J. H. COUTTS (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1911, No. 56, pp. 64*).—This contains a brief account of the history and methods of

preparing condensed milk, its composition and uses, especially for feeding infants, and a report by M. H. Gordon and R. C. Elmslie of a bacteriological investigation of some specimens of condensed milk.

None of the specimens examined proved to be sterile. Streptococci were demonstrated in all except 4 specimens. An organism obtained from one sample gave the reactions yielded by *Sarcina lutea*, and differed from all the ordinary staphylococci in failing to reduce nitrate to nitrite and to rapidly peptonize milk. Gram-negative bacilli resembling *Bacillus coli communis* were isolated from 8 samples, but none of them could be properly classified as that species. Some proved to be varieties of Friedländer's bacillus, while others gave none of the reactions of the coli type.

As far as this investigation has gone it indicates that in the process of condensing unsweetened milk sterility is secured, and that the organisms found in these milks are subsequently introduced from the air. In the case of all the sweetened milks the streptococci obtained were certainly derived from original milk, and possibly the spore-bearing anaerobe was also so derived. The *B. coli communis* group was killed in the process of condensing either by heat, or by drying, or by autolysis in the presence of large quantities of sugar.

A bibliography and regulations in other countries than Great Britain regarding condensed milk are appended.

Powdered milk, F. Marre (*Rev. Gén. Chim., 14 (1911), Nos. 14, pp. 229–232; 15, pp. 249–254*).—A discussion of the uses of powdered milk, and a description of the different methods of manufacture.

A casein product, R. Windisch (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 10, pp. 613–615; abs. in Analyst, 36 (1911), No. 425, p. 406*).—This is a by-product, resulting from the preparation of sour cream, which is used as a food in Hungary. After the cream undergoes lactic fermentation the layer of cream is removed and the remainder of the liquid is heated until a curd has coagulated, which is then collected and subjected to gentle pressure. Analyses of 123 samples yielded the following average results: Water 70.05, solids 29.95, and ash 0.7 per cent. The quantity of fat in 79 samples varied from 0.42 to 15.55 per cent.

Dairy salts, II, J. C. Brunnich and N. H. Christensen (*Queensland Agr. Jour., 27 (1911), No. 3, pp. 144, 145*).—A continuation of earlier work (E. S. R., 23, p. 782). Some samples of dairy salt contained as high as 0.83 per cent of sodium sulphate, and a like amount of calcium sulphate. The magnesium chlorid content varied from 0.07 to 0.4 per cent.

The milk supply of Chicago and Washington, G. M. Whitaker (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 138, pp. 40, pls. 8, figs. 6*).—An investigation of the sources of milk supply, milk organizations, wholesale and retail prices, and official inspections of these 2 cities.

In Chicago about 1,000,000 qts. of milk are consumed per day. In contrast to New York and Boston the greater bulk of this milk is produced within 60 miles of the city, mostly in 24 counties of Illinois, Indiana, and Wisconsin. There is no uniformity of freight rates for milk on the different roads, but these vary from 12 to 20 cts. per can according to the distance and the road over which it is sent. The dealers estimate that the rates for bottled milk are about ¾ ct. per quart. Almost the entire product is handled by the middlemen, of which there are about 1,400. The methods of the large dealers are quite different from those of the smaller. The larger dealers buy their milk by weight and bottle it at receiving stations in the country, known as bottling plants. The smaller dealers buy milk by the can and bottle it in the city. A peculiarity of the Chicago milk business is the existence of a firm of milk brokers, which will

undertake to find a customer for a producer who wishes to begin selling milk, or will find a producer for any middleman who wishes to go into the business.

In the District of Columbia about 76,000 qts. are consumed per day, which is obtained from 1,091 farms lying in the neighboring counties of Maryland and Virginia. About one-third of the milk is brought in by wagons. Most of the shipments by steam or electric road are in 40-qt. cans. The freight rates on the steam road are from 2 to 3 cts. per gallon, according to distance, and on the electric road from ½ to 1½ cts. per gallon. Statistics show a constantly decreasing number of producers. Conditions pertaining to production are improving from a sanitary point of view.

Brief instructions for farm butter makers, F. A. CLOWES (*Hawaii Sta. Press Bul. 31, pp. 10, figs. 4*).—A bulletin of practical information for making butter on the farm under Hawaiian conditions.

How to make Slipcote cheese (*Dairy, 23 (1911), No. 274, p. 284*).—A description of the method of making this old-fashioned soft cheese common in Rutlandshire and the surrounding country.

The cheese of Saint-Marcellin, C. GROUD (*Indus. Lait. [Paris], 36 (1911), No. 41, pp. 677, 678*).—A note on the characteristics of this small white cheese made in the region of the French Alps. It was originally made of goat's milk, but now is generally mixed with cow's milk and the details of manufacture vary considerably.

The financial aspect of cheese making (*Agr. Gaz. N. S. Wales, 22 (1911), No. 9, pp. 771–773*).—This financial statement contains details of the cost of making cheese as follows: Cost of milk per pound of cheese, at a factory using 1,000 gal. of milk per day, 5.051d.; cost of materials, manufacture, sale, etc., 0.944d. The cost of making it at the Hawkesburg Agricultural College was for milk 4.292d. and for materials, manufacture, sale, etc. 1.705d.

VETERINARY MEDICINE.

Special pathology and therapy of the domestic animals, F. HUTYRA and J. MAREK (*Spezielle Pathologie und Therapie der Haustiere. Jena, 1910, 3. ed., rev. and enl., vols. 1, pp. XVI+1132, pls. 10, figs. 198; 2, pp. XIV+1074, pls. 5, figs. 163*).—In this, the third edition of the work (E. S. R., 21, p. 77), the changes of importance made are the addition of discussions of Malta fever, three-days sickness, leukemia in fowls, oesophagostomiasis and dochmiasis in bovines, enzootic cretinism in animals, serum disease, and necro-bacillosis, and the rewriting of the chapters on hemorrhagic septicemia in sheep, coccidial dysentery in animals, avian pox and avian diphtheria, enzootic equine paraplegia, scorbutis, paralysis of the bladder, protozoan diseases, and psychoses. The newer findings in the field of chemotherapy are also included.

Encyclopedia of microscopical technique, edited by P. EHRLICH ET AL. (*Enzyklopädie der Mikroskopischen Technik. Berlin and Vienna, 1910, vols. 1, pp. IV+800, figs. 56; 2, pp. 680, figs. 111*).—This publication, which is in 2 volumes, deals with microscopical technique as applied to the medical and natural sciences.

Dark ground illumination and ultramicroscopy in biology and medicine, N. GAIDUKOV (*Dunkelfeldbeleuchtung und Ultramikroskopie in der Biologie und in der Medizin. Jena, 1910, pp. VI+83, pls. 5, figs. 13*).—This book considers the principles and nomenclature of ultramicroscopy and the various apparatus used for this purpose. In addition it treats of the following subjects: Structure of the colloids; ultramicroscopical examination of sera and of solutions of proteins and carbohydrates; examination of the blood, animal cells, spermatozoa, and

membranes of the eye; bacteriological examinations; examinations of botanical subjects; the colloids of the plant cells; and the examination of textile fibers.

A bibliography is appended.

An address on meat inspection, E. VAN ES (*North Dakota Sta. Spec. Bul. 31, pp. 304–310*).—A popular account.

In regard to the influence of castration upon the red blood corpuscles and hemoglobin content of the blood of bovines, pigs, and sheep, M. SUSTSCHOWA (*Arch. Anat. u. Physiol., Physiol. Abt., 1910, No. 1–2, pp. 97–112; abs. in Zentbl. Biochem. u. Biophys., 11 (1910), No. 1, p. 29*).—Castration was found to diminish the hemoglobin and erythrocyte content. Age and sex, however, also have some influence upon the hemoglobin content.

The relation of chemistry to immunity research, G. SALUS (*Österr. Chem. Ztg., 13 (1910), No. 23, p. 289*).—This article has particular relation to Ehrlich's work and dioxydiamidoarsenobenzol.

Serodiagnosis of carcinoma, with particular reference to the complement fixation method, LESCHKE (*München. Med. Wchnschr., 58 (1911), No. 30, pp. 1642, 1643*).—It is not possible to detect atypical ferments (which originate from malignant growths) and their cleavage products in the circulating blood. Certain imperfections are still present in the precipitation and anaphylaxis reactions when applied to malignant growths, while the meiostagmin reaction can not be considered specific.

An antigen made by dissolving a portion of a malignant growth in antiformin was used by the author with the complement fixation method. With 42 cases of carcinoma the reaction was positive in 93 per cent, and in 116 sera from other diseases it was positive in 10 per cent.

Modified vaccine therapy, A. F. SCHAFER (*Ther. Gaz., 35 (1911), No. 4, pp. 257–264, charts 6; abs. in Jour. Amer. Med. Assoc., 56 (1911), No. 19, pp. 1421, 1422*).—The vaccines used by this author are neither bacterial vaccines nor serum, as ordinarily understood, but instead are sterile watery solutions of the soluble substances produced by the organism in suitable media. The solutions so obtained are filtered through a bisque filter and are preserved with phenol.

The physiological significance of the leucocytic reaction in infection and intoxication, L. BRUNTZ and L. SPILMANN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 5, pp. 288, 289*).—The leucocytic reaction in infection and intoxication is characterized at first by a hypoleucocytosis of short duration, which corresponds to the period of invasion. This is succeeded by a hyperleucocytosis, during which stage the products destined for elimination are collected by certain forms of leucocytes and conducted to the excretory organs.

In regard to the method of determining the proteolytic leucocytic ferment and the (proteolytic) ferment index of the leucocytes of human blood, M. FRANKE (*Wiener Klin. Wchnschr., 23 (1910), No. 33, pp. 1200–1206, figs. 2; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 1–2, p. 60*).—A description of the method for obtaining the ferment, and a discussion in regard to the relation which the proteolytic index has to pathological conditions.

A new method for preserving various immune sera and antigens, S. STÖKEL (*Wiener Klin. Wchnschr., 23 (1910), No. 43, pp. 1513–1515; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 1–2, p. 53*).—The author points out the fact that immune sera and antigens can be preserved by using fused sodium sulphate as a desiccating agent, as recommended by Fränkel and Elfer (E. S. R., 24, p. 585). The amounts most favorable for the preservation and the advantages to be derived from its use are stated.

The oral administration of antitoxins, C. MCCLINTOCK and W. E. KING (*Jour. Infect. Diseases, 6 (1909), No. 1, pp. 45–65; abs. in Hyg. Rundschau, 21 (1911), No. 5, p. 261*).—This work brings out the fact that antitoxic serum can

be given per os without disturbing its activity, providing a 1 per cent solution of sodium bicarbonate, some extract of opium, and a saturated solution of salol in chloroform are given ½ hour before the antitoxin is administered.

Seven cases of anthrax in man, E. VOLLMER (*Ztschr. Med. Beamte, 23 (1910), No. 8, pp. 271–276, pl. 1; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1910), No. 8, pp. 225, 226*).—A description of 7 cases of anthrax (pustula maligna) in man, which had their origin in the hides of cattle which were infected with anthrax. According to the author the tanning process does not destroy the spores of the anthrax bacillus.

Malta fever in the Gard, C. DUBOIS (*Bul. Inst. Pasteur, 9 (1911), No. 13, p. 613*).—This is a study in regard to the etiology, geographical distribution, and pathology of this disease. Out of 195 goats examined by the lacto- or sero-diagnostic methods, 13 gave positive results. Fifty-seven per cent of the cases were in males. It is also pointed out that chickens can be mortally infected, and furthermore, that the disease can be transmitted to man.

Concerning the presence of the embryos of Trichinella spiralis in the blood of patients suffering from trichiniasis, A. R. LAMB (*Amer. Jour. Med. Sci., 142 (1911), No. 3, pp. 395–402, fig. 1*).—"In the examination of the blood sediment for the embryos of *T. spiralis* we have a valuable means of diagnosis in cases suggesting trichiniasis. . . .

"The technique of the examination is very simple. While the search for the embryos is tedious, it is scarcely more so than the examination of the blood for the plasmodium of malaria. The earliest time at which the embryos may be found in the blood is on the sixth or seventh day after infection. The latest date is not accurately fixed. While the parasites have not been found later than the twenty-seventh day after infection in guinea pigs, or later than the twenty-second day after the onset of symptoms in man, there is some ground for the belief that they may occasionally be recovered in the fifth or possibly the sixth week after infection."

The identification and classification of trypanosomes of mammals, A. LAVERAN (*Ann. Inst. Pasteur, 25 (1911), No. 7, pp. 497–517, fig. 1; abs. in Sleeping Sickness Bur. [London] Bul., 3 (1911), No. 30, pp. 356–360*).—A study of the identification and classification of trypanosomes of mammals.

Further investigations of trypanosomes of cattle in the District of Upper Westerwald, together with a contribution to the knowledge of parasitic flagellates of blood-sucking flies (Tabanus and Hæmatopota) in Germany, P. KNUTH and G. RAUCHBAAR (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 2–3, pp. 140–154, pls. 2; abs in Sleeping Sickness Bur. [London] Bul., 2 (1910), No. 21, p. 371*).—The authors find *Trypanosoma franki* to resemble closely, or be identical with, *T. theileri*. The flies examined were mostly *Hæmatopota pluvialis* and in a few instances species of Tabanus. The technique of the examination is described and a bibliography of 21 titles is appended.

The resistance of goats and sheep to trypanosomiases; the long duration of acquired immunity following these diseases, A. LAVERAN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 2, pp. 63–66; abs. in Sleeping Sickness Bur. [London] Bul., 3 (1911), No. 25, pp. 126, 127*).—The author calls attention to the fact that while both sheep and goats are susceptible to most of the trypanosomiases these infections usually take light forms which end in recovery, whereas in most other animals they usually terminate fatally. The symptoms are little marked; at the beginning there are often febrile attacks but unless the temperature is taken regularly these in most cases pass unnoticed.

Acquired immunity lasts a long time in both the sheep and goat. In one instance the immunity of a goat to *Trypanosoma evansi* continued 2 years and 4 months. A similar instance is given of a sheep immunized successively to

T. pecaudi, T. dimorphon, and *T. congolense*, in which the immunity to *T. dimorphon* still existed 22 months after recovery from the *T. dimorphon* infection. The serum of such sheep and goats keeps its activity for a long time when used in admixture with virulent blood. In one case the serum of a sheep was active 2 years and 6 months after recovery from *T. dimorphon* infection. Attention is called to the fact that in consequence of this resistance of sheep and goats and the long lasting immunity which a first attack often confers on them, the rearing of these animals may succeed in countries where trypanosomiasis is endemic.

A trypanosome disease of the camel in German Southwest Africa, REINECKE (*Ztschr. Veterinärk., 23 (1911), No. 1, pp. 1–12; abs. in Sleeping Sickness Bur. [London] Bul., 3 (1911), No. 28, p. 263*).—The trypanosomes contained in smears from 5 camels at Kalkfontein and from 2 camels at Gochas were similar to *Trypanosoma brucei* and *T. evansi*, corresponding with the latter in almost all points. The disease is thought to be identical with the variety of surra, known as "mbori." Transmission experiments with Stomoxys and Hippobosca were unsuccessful.

A bibliography of 31 titles is appended.

The etiological diagnosis of tuberculosis, W. C. WILKINSON (*Brit. Jour. Tuberculosis, 4 (1910), No. 1, pp. 40, 41; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 4, p. 204*).—"Koch's tuberculin test is simple, safe, and trustworthy. Von Pirquet's is much superior to Calmette's, but should only displace Koch's when there is much fever. The agglutination test is worthless. Wassermann's reaction in tuberculosis requires great skill and extensive laboratory equipment. The opsonic test is only mentioned to be condemned unreservedly."

The technique of determining the opsonic index, H. REITER (*Deut. Med. Wchnschr., 36 (1910), No. 52, pp. 2426–2428; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No 1–2, p. 60*).—A detailed description of the procedure. Besides Wright's instruments, other handy apparatus is described.

An improved antiformin method for tubercle bacilli, LORENZ (*Berlin. Klin. Wchnschr., 48 (1911), No. 3, pp. 118, 119; abs. in Ztschr. Tuberkulose, 17 (1911), No. 3, p. 289*).—This is a modification of the Uhlenhuth method, which consists of boiling the sputum antiformin mixture after it has been completely homogenized.

Precipitation of an aqueous tuberculin with the serum from tuberculous subjects, S. ARLOING and P. COURMONT (*Lyon Med., 114 (1910), No. 18, pp. 968–972; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1910), No. 2, pp. 69, 70*).—The authors point out that they were able to precipitate an aqueous decoction of a homogenous culture of the tubercle bacillus with human and animal serum from normal and tuberculous subjects. According to the authors, the reaction is not an agglutinating one nor is it a specific reaction for tuberculin.

Tuberculosis in dogs, E. SCHRUM (*Über Hundetuberkulose. Inaug. Diss., Univ. Bern, 1910, pp. 62; rev. in Ztschr. Tuberkulose, 17 (1911), No. 3, p. 301*).—After making a statistical study of the prevalence of tuberculosis in dogs, the author tested dogs in regard to their receptiveness for tuberculous infection. It was noticed that dogs are decidedly resistant toward the disease and that this is irrespective of the type of bacillus used.

In regard to immunizing against tuberculosis and the serum treatment of tuberculosis, A. D. PAWLOWSKY (*Ztschr. Tuberkulose, 17 (1911), No. 1, pp. 1–26*).—The author, after giving an extensive review of the literature on the subject, details his own experiments with chickens, goats, guinea pigs, horses, dogs, and rabbits.

He concludes that the curative substance is contained in the body of the bacillus itself. The tuberculous process always begins by forming miliary tubercles and goes over to pus formation, then the tubercle is resorbed and is finally converted into scar tissue. As neither the filtrate from tubercle bacilli, bacilli killed by heat, old tuberculin, pure tuberculin, tubercle bacilli minus tuberculin, tubercle bacilli minus chloroform or xylol extract, bacterial substances soluble in potassium hydrate, nor extracts in a 0.7 per cent sodium chlorid solution stimulate tuberculosis to healing, it is very probable that the proper course for future experimentation lies in the way of using the absolutely dry, ground bacilli with the proper therapeutical precautions and in doses not to produce a febrile reaction.

A large bibliography is appended.

Poisoning by plants and plant substances, F. KANNGIESSER (*Vergiftungen durch Pflanzen und Pflanzenstoffe, Ein Grundriss der Vegetalen Toxikologie fur praktische Aerzte, Apotheker und Botaniker. Jena, 1910, pp. 49; rev. in Zentbl. Physiol., 25 (1911), No. 2, pp. 65, 66*).—This book contains a description of the symptoms of poisoning, the use of the stomach tube, emetics, and kindred therapeutical measures. Its contents include general vegetable toxicology, and poisoning by herbs, berries, etc., fungi, cereals, condiments and narcotics, plant drugs, and plants which irritate the skin and mucus membrane.

Are flaxseed screenings poisonous to stock? E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 31, pp. 316, 317*).—The author here quotes from 4 letters regarding the loss of animals through the consumption of flaxseed screenings. In 1 herd of 19 all died, while in a second of 10, 5 died.

Flaxseed screenings poisonous, E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 35, p. 393*).—Analyses made of several samples of flaxseed screenings showed clearly the presence of a compound easily broken down into hydrocyanic acid. In the samples used in the feeding experiments noted below, 0.2169 gm. hydrocyanic acid for each pound of screenings was found in the first case and 0.408 gm. hydrocyanic acid in the last. In 1911 immature seed bolls of flax were also analyzed and in each pound was found 0.7726 gm. of hydrocyanic acid.

Experiments upon flax screenings, J. W. INCE (*North Dakota Sta. Spec. Bul. 35, pp. 393–396*).—Examinations made of samples of flax screenings reported to have caused the death of cattle and sheep showed the presence of a varied number and kind of weed seeds, but none of a poisonous character. In some samples there were more or less oats, wheat, and flax, the latter being partly good and partly broken or frosted. Chemical analysis failed to demonstrate the presence of an alkaloid but showed hydrocyanic acid to be present.

Feeding experiments with a healthy, 2-year-old heifer were conducted in cooperation with the veterinary department. The animal having been well fed prior to the experiment would not eat the screenings so was fed by force from a bottle with material extracted with water which had been acidulated with tartaric acid. An equivalent of 4½ lbs. of the original screenings given on May 18 resulted in toxic symptoms, from which she recovered, as was the case with a second feeding on May 22 of an equivalent of 4 lbs. of the original material. A third feeding on May 26 of an equivalent of 12 lbs. of the samples resulted in the death of the animal in 92 minutes.

Quantitative determinations showed that 0.9583, 0.10736, and 4.892 gm. of hydrocyanic acid, respectively, were fed to the animal. Thus it is clearly evident that flaxseed screenings may contain hydrocyanic acid in sufficient quantities to cause the death of animals, even when the screenings are fed in moderate quantity.

An undescribed pathogenic bacterium in milk, E. C. SCHROEDER and W. E. COTTON (*Amer. Vet. Rev., 40 (1911), No. 2, pp. 195–206, figs. 5*).—An udder organism was isolated from the milk of a tuberculous cow which at first could be grown only on agar containing 6 per cent of glycerin and from 1 to 20 per cent of ox gall (the most vigorous growth being in a medium containing 5 per cent or more of ox gall). On this medium the organism grew superficially and appeared as small, pearly, slightly convex, pale gray colonies. Later it was found to grow well on an ordinary medium, or on agar which had been smeared with the pulp of spleens from healthy guinea pigs. In stab cultures the growth was mainly at the surface. It is Gram-positive, has an optimum temperature of from 37 to 39° C., a thermal death point of 60°, and is non acid-fast. Morphologically considered, the bacillus has rounded ends about the size of the bovine type of the tubercle bacillus.

"Guinea pigs become infected either through the inoculation or the ingestion of pure cultures or of naturally infected milk, but show no well marked lesions until after the passage of 6 weeks or more." With some practice the lesions caused by this organism in guinea pigs can be distinguished from those caused by the tubercle bacillus. The bacillus could be repeatedly isolated from the lesions. "Probably the most remarkable thing about the bacillus is [that it is expelled] from the bodies of apparently healthy cows with their milk. . . . Among 140 cows the bacillus was found in the milk of 19, and among 36 cows it was being passed by 11. The 140 cows form a herd that has been repeatedly tested with tuberculin, and which is very probably free from tuberculosis."

Investigations in regard to the spontaneous infection of milk with Bacterium syncyaneum (blue milk) and tests in regard to eliminating this disorder, A. SCHULTZE (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 5, pp. 90–95, fig. 1*).—Cases are cited from which *B. syncyaneum* could be isolated from milk which was taken under sterile conditions from the udders of 8 cows. The infection was usually present in all of the quarters of the gland. The author does not believe the air to be the carrier of the infection, but in one instance flies were found to convey the infection from an infected milk to a sterile one. An abrupt change of food in no instance produced blue milk. Attempts to remove the infection within the udder resulted in showing that it was possible to eliminate the condition by injecting antiseptic fluids (such as 4 per cent boric acid solution at 38° C., or a warm 0.5 per cent creolin solution) and proper external disinfection for a period of 8 days.

A method for detecting cows the milk of which contains an abnormal amount of leucocytes, fibrin, and bacteria, H. M. HÖYBERG (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 5, pp. 133–147*).—The method consists of adding 5.5 cc. of an alcoholic solution of rosolic acid (0.45 cc. of 1 per cent alcoholic solution of rosolic acid mixed with 5 cc. 96 per cent alcohol) to 5 cc. of milk from each quarter of the gland. Milk from a normal gland yields a yellow-orange coloration, while that from an inflamed gland and containing the products of inflammation gives a red coloration which varies between a red salmon red and a carmine red. Milk which contains an excess of leucocytes, bacteria, and fibrin gives a positive alkaline reaction. Milk obtained from cows which calved during a space of from 1 to 3 weeks gives a yellow (acid) reaction. Old milking cows often yield alkaline milks, but the author found that where the udder was sound no red reacton (alkaline) was obtained. The method is recommended for cases where the clinical symptoms are not yet manifest.

How to make and use anti-hog cholera serum, M. S. PETERS ([*Kansas City, Mo.*], *1911, pp. 40, figs. 7*).—This publication has been prepared, as the

author states, for the express purpose of enabling the American hog raiser to make his own serum and to vaccinate his own hogs.

Suptol-burow and swine plague, W. GOTTSCHALK (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 14, pp. 237, 238*).—In the hands of this author the preparation gave good results.

Dourine of horses: Its cause and suppression, J. R. MOHLER (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 142, pp. 38, pls. 5*).—This is a report of studies following an outbreak of dourine in Taylor County, Iowa, in May, 1911. The causative agent, *Trypanosoma equiperdum*, was observed by the author on June 28, in blood-tinged serum obtained from a recently developed plaque on the abdomen of an infected mare, after a careful and prolonged examination of a large number of slides, this being the first discovery of *T. equiperdum* in natural cases of dourine in the United States.

In this country dourine was first recognized at Bloomington, Ill., in 1886, when it was traced to a Percheron stallion imported from France in 1882. In 1892 another outbreak occurred in northwestern Nebraska, probably originating from that in Illinois, and although supposed to have been eradicated five years later it again appeared in the same portion of Nebraska and later in South Dakota. In 1903, the disease was discovered in Van Buren County, Iowa, where it had been apparently introduced with an imported Percheron stallion, and in 1904 its presence was discovered in Canada.

A report is presented of studies of the disease, including a search for and cultivation of *T. equiperdum*, its infectiveness, symptoms, post-mortem lesions, prognosis, course, differential diagnosis, treatment, and method of eradication. During the investigations a case was met in which the American disease was transmitted by a stallion indirectly from an infected to a normal mare. Both the American and the European disease were transmitted by subcutaneous inoculations of infected blood. The length of time which this protozoan lives when kept in blood or body fluids taken from dead animals has been found to vary considerably. In the blood of an infected dog imported from France, as well as in physiologic salt solution emulsions of the liver and spleen, the parasites have been found actively motile on the second day and a few still observed on the third day, but on the fourth day none have been found, showing that they were all destroyed between 72 and 96 hours after the death of the host. By the continued inoculation of a medium composed of 3 parts of blood to 1 of agar with great numbers of the organism, it was successfully cultivated, 14 generations, covering a period of over 9 months, having been grown and no difficulty experienced in keeping the trypanosomes alive by frequently transferring them to fresh medium. The inoculation of experimental animals with these cultures seems to indicate that there was some reduction in their virulence, but too small a number of inoculations have been made to draw definite conclusions.

Little benefit can be obtained from the medicinal treatment, although some cases have been observed where improvement and recovery followed local treatment when applied in the early stages of the infection. When, however, any systemic symptoms appear, drugs seem to be useless and deaths follow after very varying periods of time in different cases. The method of eradication included the slaughter of diseased mares, castration or slaughter of diseased stallions, castration or quarantine of exposed stallions, and the frequent reinspection of exposed mares.

The action of phenols upon "virus fixe" of rabies, W. J. SAWTSCHENKO (*Kharkov. Med. Jour., 10 (1910), No. 8, pp. 266–270; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 13, p. 1109*).—The results show that the stronger solutions of phenol (up to 5 per cent) do not destroy the virus. A

"virus fixe" which was treated for 24 hours with a 5 per cent solution of phenol was able to produce typical rabies after a period of 10 days' incubation.

Hydrophobia in the Philippines, F. W. DUDLEY and E. R. WHITMORE (*Philippine Jour. Sci., B. Med. Sci., 5 (1910), No. 5, pp. 455–459, pl. 1*).—"The authors have shown . . . that rabies occurs among dogs in the Philippines, (a) by finding Negri bodies in the brain tissue of 2 dogs killed for suspected rabies; (b) by carrying the virus from the brains of one of these dogs through 7 passages in rabbits, rabbits of the seventh passage dying in 9 days of typical experimental rabies; (c) by demonstrating the presence of Negri bodies and Lentz passage bodies in the brain tissue of these rabbits up to the third passage.

"It was also shown that rabies occurs in the human in Manila, (a) by observing a case that was clinically typical rabies; (b) by carrying the virus from the brain of that case through 3 passages in rabbits, the rabbits of the third passage dying of typical experimental rabies in about 2 weeks; (c) by demonstrating the presence of Negri bodies and Lentz passage bodies in the brain tissue of 3 rabbits up to the third passage." The authors have further "succeeded in bringing a fixed virus from Saigon to Manila in animals and also in neutral glycerin in a refrigerator. The virus brought in both ways has retained its full virulence since its arrival in Manila."

Entero-hepatitis (amœbiasis), B. F. KAUPP (*Amer. Vet. Rev., 39 (1911), No. 4, pp. 410–416, figs. 5*).—This paper includes studies of the disease in a flock of 60 fowls of which 25 had died at the time of the investigation.

RURAL ENGINEERING.

Power and the plow, L. W. ELLIS and E. A. RUMELY (*Garden City and New York, 1911, pp. 318, pls. 22, figs. 25*).—This book discusses in a nontechnical way the various sources of power for farm implements, with special attention to traction plowing. Data are summarized on the history of plowing with both animal and mechanical power, the mechanical principles of plows and plowing, conditions affecting plowing and the choice of plows, and the draft of plows and other implements; the efficiency for draft purposes, particularly plowing, of the horse, the steam tractor, and the internal combustion tractor, the adaptability of cable plows, auto plows, the general purpose motor, and a combination of animal and mechanical power to tillage operations; and the outlook for traction farming in the future. Descriptions are given of the various types of tractors and plows and their qualifications for different kinds of farming are discussed in detail. Specifications of leading gas tractors and a bibliography are appended.

Tests of centrifugal pumps, B. P. FLEMING and J. B. STONEKING (*New Mexico Sta. Bul. 77, pp. 81, figs. 34*).—In conducting experiments in 1908–9 (E. S. R., 22, p. 792) to determine efficiency and relative cost data for pumping plants under given conditions, the unexpected low efficiency ratings for centrifugal pumps (in no case higher than 51.8 per cent), suggested experiments to determine the exact relative efficiency of pumps under varying heads and at varying speeds.

Eleven pumps with discharge pipes varying from 1½ to 6 in. were tested under the same physical conditions, each being rated at varying speeds and pumping against different lifts. For each specific condition the efficiency was determined, the percentage rating being the ratio of the useful horsepower to the electrical horsepower supplied the pump. The resultant curves under the various conditions under which each test was made were platted for each pump. The significant feature of these curves is that for each pump tested there is a point of maximum efficiency, that is, each pump did its best work against some par-

ticular lift at some particular speed. The complete conditions of each test were also entered in tabular form and a summary of results tabulated.

For these 11 pumps the highest efficiency ranged from 33 per cent for a 6 in. pump (practically new) operated at 855 revolutions per minute against a head of 35 ft. discharging 600 gal. per minute, to 56.5 per cent for a 6 in. pump (which had been used for several years) operated at 570 revolutions per minute against a head of 34 ft., discharging 500 gal. per minute.

Marked discrepancy was found between the ratings given the pumps in the manufacturers' catalogues and those shown by test. "Instead of rating pumps by the so-called 'economic capacity,' it would greatly add to the advantage of the prospective purchaser if the manufacturer should publish tables or exhibit curves based on reliable tests from which one might choose the size of pump and determine the speed which would give the greatest economy or highest efficiency for the desired discharge at the given head. . . .

"Large pumps show better efficiencies than small ones, hence it may be better to use a pump of over rather than under size, other conditions being the same."

"As a final conclusion, it may be said that the best pump for any given set of conditions is not necessarily the one giving the highest efficiency since the question is one involving all the various factors which enter into the cost of operation. Thus a pump of high efficiency might be more expensive than one of lower efficiency so that, if, as is not infrequently the case, the pump is used only a few months out of the year, the saving in fuel effected by the pump of higher efficiency may be more than balanced by the greater yearly interest charge. Again a pump of certain capacity might require a higher speed than another pump of similar capacity and the same or perhaps slightly lower efficiency. Other conditions being the same the pump of lower speed should be chosen because of its probable longer life."

Practical deductions drawn from the test as applied to different conditions are also presented and discussed.

Bagasse drying, E. W. KERR and H. A. NADLER (*Louisiana Stas. Bul. 128, pp. 3–40, figs. 7, pl. 1*).—Continuing previous studies (E. S. R., 22, p. 115) the problem of utilizing the waste smoke-stack heat for drying bagasse for the purpose of obtaining a greater fuel value for this material was studied with particular reference to Louisiana conditions, where the bagasse usually contains between 52 and 55 per cent of moisture.

The dryer used in the tests was designed to be operated in connection with a 100-horsepower boiler and consisted essentially of a rectangular sheet iron box about 4 by 6 ft. and 20 ft. high having within it 6 inclined shelves 4 ft. square and supported on a framework of angle irons. The bagasse is let in at the top of the apparatus where it falls upon the uppermost inclined vibrating shelf, and from which it slides to each of the other shelves in turn until the bottom is reached, where it comes out, passing through mechanically operated doors. The smokestack gases are conducted into the bottom of the dryer. The necessary draft is induced by a 55-in. fan, which is placed near the top of the apparatus. The cost of the apparatus exclusive of the engine for driving it was $1,000.

The following results were obtained from some 40 evaporative boiler tests, the advantage due to drying being measured by the weight of water evaporated per pound of bagasse burned:

"The average moisture in the bagasse entering the dryer was 54.3 per cent, and leaving it, 46.4 per cent, which means that 14.5 per cent of the moisture in the bagasse was removed by the drying process. The average equivalent evaporation from and at 212° F. per pound of wet bagasse burned was 1.63

lbs. and that for the partially dried bagasse, 2.53 lbs. This shows that 1 lb. of the partially dried bagasse had a heat value of 55.2 per cent greater than that of 1 lb. of wet bagasse. . . .

"The average boiler efficiency for the tests with the dryer in use was 63.5 per cent, and that with undried bagasse, 50.7 per cent. The increased efficiency with partially dried bagasse is probably due to less smoldering during combustion and to higher furnace temperatures. Based on an equivalent evaporation of 14 lbs. of water from and at 212° per pound of oil, the saving due to drying was calculated to be 2.57 gal. of oil per ton of cane. . . .

"The average temperature of gases entering the dryer was 474°, and that leaving the dryer, 219°. The weight of bagasse handled per hour varied from 686 to 3,150 lbs. The percentage of reduction in moisture seemed to be as great with heavy as with light feeds. . . . The loss of heat from the dryer due to radiation was 8.3 per cent."

Concrete silo construction, C. A. Ocock and F. M. White (*Wisconsin Sta. Bul. 214, pp. 3–31, figs. 18*).—This bulletin gives directions in detail for the construction of several types of concrete silos, especially the reinforced concrete or monolithic silo. The authors state that the scarcity of lumber and its high price in many localities is the factor which has emphasized the importance of more permanent silos, and that reinforced concrete is equal if not superior to all other materials used in the construction of silos. Tables are given showing the relation of the size of the silo to the amount of silage to be used daily, and the capacity of silos.

Forms for solid-wall silos were found to cost from $40 to $70. In the construction of a 6-in. wall reinforced concrete silo, 14 ft. inside diameter by 35 ft. high, on the University Farm in 1910, 50 bbls. cement, 28 yds. crushed stone, and 16 yds. sand were used, the proportions used being 1 : 2½ : 5. The reinforcement and galvanized iron for the door in the roof cost $25, the material $129, doors $4.60, rent for staging $5, labor $159, making the total cost exclusive of the forms $293.

For reinforcement cables made by twisting together good grade No. 9 telephone wire, thereby obtaining a rougher surface, are considered better than smooth rods. Tables give the amount, size, and spacing of reinforcement, and directions are given for placing it. In all cases the reinforcement should be placed about 1½ to 2 in. from the outside of the wall.

General directions are given for the construction of concrete-block silos, and for a good homemade concrete-block machine, which is illustrated. Notes on the stave silo, the Gurler silo, and the general care of silos are included.

New uses of explosives in agriculture, F. H. Gunsolus (*Jour. Franklin Inst., 172 (1911), No. 2, pp. 153–161, figs. 3; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 17, p. 1078*).—This article refers to the well-known use of explosives for clearing land, but devotes attention particularly to their use for the preparation of soil for the planting of trees, the loosening of impervious subsoils, digging of ditches, and draining of ponds and swamps. Other purposes for which explosives may be used with advantage are stated to be grading roads, digging cellars, excavating trenches for foundations, pipe lines, tiling, etc., digging holes for poles and fence posts, and sinking wells.

Making electricity do the work on farm, C. A. Shamel (*Orange Judd Northwest Farmstead, 7 (1911), No. 16, pp. 324, 325, figs. 5*).—The installation and cost of maintenance are discussed of an electric power plant on an Illinois farm. The plant furnishes electricity for operating farm machinery, running washing machines and the churn, cookery, and other farm and household tasks.

RURAL ECONOMICS.

Principles of rural economics, T. N. CARVER (*Boston and London, 1911, pp. XX+386, dgms. 7*).—In this treatise the author directs attention to some of the salient features of the rural problem, giving greater consideration to the public and social aspects of the problem than to the business side of the subject. He gives a historical sketch of modern agriculture, discusses some general economic principles as applied to agriculture, factors of agricultural production, the distribution of agricultural income, management as a factor in agricultural production, and problems of rural social life.

An extensive bibliography is included.

Cooperation among farmers, J. L. COULTER (*New York, 1911, pp. VII+281, pls. 2*).—In order to meet the demands of many farmers for information concerning the possibilities of cooperation and details as to the formation of local societies, the author has prepared this volume in which he discusses the significance of cooperation among farmers and gives an account of the most successful organizations, the best form of organization, and the possibilities of cooperation among farmers in many of their activities. He submits plans of various kinds of organization among dairy farmers; methods of marketing butter and cheese; the production and marketing of animals for meat; the storing and marketing of grain; and marketing vegetables, poultry, eggs, fruits, nuts, etc., together with an account of the development of cooperative stores in the United States.

The cooperative farmer, J. L. COULTER (*World's Work, 23 (1911), No. 1, pp. 59–63*).—This article presents a discussion of the cooperative movement among farmers, together with a summary of the work being done by many of the leading cooperative associations in the United States.

The practical operation of associations, J. H. Ross (*Fla. Grower, 5 (1911), No. 4, pp. 1, 3, figs. 2*).—This is an address delivered by the president of the Florence Citrus Growers' Association of Florida in which the actual operations of that association regarding organization, management, wages, efficiency of employees, pooling, marketing, etc., are explained in detail.

Agricultural cooperative societies in Germany (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1911, No. 4773, pp. 46–48*).—Data are here briefly summarized as to the status of these societies.

Missouri farm facts and rural problems, W. L. NELSON (*Ann. Rpt. No. Bd. Agr., 43 (1910), pp. 424–454, fig. 1*).—The author presents answers obtained to a number of questions sent to about 600 representative farmers in Missouri, among them is this question: "What, in your opinion, is the greatest need of the farmer of to-day, or the greatest problem with which he must contend?"

Of the 440 who replied 40 per cent answered, "Hired help," 14 per cent, "The maintenance and improvement of soil fertility," and 16 per cent, "Good roads." Seventeen correspondents replied that the farmers' greatest problem is how to combat combinations that are believed to fix prices for what he sells or buys. Thirteen believe too much extravagance exists on the farm; 10 that the greatest problem is the elimination or curtailment of the powers of the middleman, and 9 name cooperation in buying and selling as the greatest need. Among some of the other needs mentioned were better transportation facilities and lower freight rates, increased production per acre, better schools, and more agricultural science.

Opinions are also given by 361 women as to what changes or improvements in the farmhouse would be of greatest benefit. More than 53 per cent favored some system of running water.

The article further presents considerable statistical data as to farm conditions for the State.

Agricultural laborers (*Bd. Trade* [*Gt. Brit.*], *Rpt. Changes in Rates of Wages and Hours of Labour, 18 (1910), pp. 24–27*).—This report gives notes and statistics relative to the current rates of weekly cash wages paid to agricultural laborers in 625 rural districts of England and Wales in 1910, together with changes in the weekly rates of wages for a period of years. The number who received an increase in wages during 1901 is estimated at 127,565 and the number receiving a decrease at 10,469. The number receiving an increase in 1910 is shown to be 15,451, and the number receiving decreases 271, while the number in districts where wages were reported as unaltered is shown to be over 400,000. It is further noted that for every year from 1901 to 1910, excepting 1905, the number of laborers affected has been smaller in districts in which wages have fallen than in districts in which they have risen.

Tariff revision and agrarian protection in Belgium, M. Lauwick (*Rev. Écon. Internat., 8 (1911), III, No. 2, pp. 256–282*).—This article discusses the necessity of tariff reform, instituting the agrarian policy in Belgium and its rsults, agricultural prosperity, the rise in the price of protected foods, the deficiency of Belgium cattle in meeting the domestic consumption, together with some proposed reforms.

Law for the American farmer, J. B. Green (*New York, 1911, pp. XVI+438*).—This book presents an analyzed summary of the law as it applies to the farm and farmer, giving the law as interpreted by the courts in the United States in such a style as to enable the farmer to recognize readily his rights and obligations in case of portended litigation.

Ohio farm laws with business forms and business letters, W. K. Williams (*Columbus, Ohio, 1910, rev., pp. 160*).—This book presents a compilation of Ohio farm laws, and business forms, business letters, etc., which are intended to be of special interest to the farmer.

Agricultural law, 1911 (*N. Y. Dept. Agr. Bul. 27, 1911, pp. 965–1075*).—This is a codification of the agricultural law of New York State, including amendments made during the legislative session of 1911.

Swine on farms in continental United States (*U. S. Bur. Census* [*Press Bul.*], *1911, Nov. 9, folio*).—This article, issued by the Bureau of the Census November 9, 1911, shows by the following table the number of farms reporting swine, together with the number and value of all swine reported on the farms of the United States in 1900 and 1910:

Swine on farms in continental United States, April 15, 1910, and June 1, 1900.

	1910.	1900.	Increase.	
			Amount.	Per cent.
Number of farms reporting	4,340,592	4,335,363	5,229	0.1
Per cent of all farms	68.5	75.6	.....	.....
Number of all swine	58,000,632	62,868,041	4,867,409	7.7
Value of all swine	$398,002,878	$231,978,031	$166,024,847	71.6
Average value	$6.86	$3.69	$3.17	85.9

A decrease of 7.7 per cent is noted in the total number of swine since 1900, but in spite of this the report shows a material increase in the value of all swine reported, the average value per head being $3.69 in 1900 and $6.86 in 1910, an increase of 85.9 per cent. This increase is partially attributed to the change in the date of enumeration, assuming the 1910 report to include a much larger proportion of mature hogs and a smaller proportion of spring pigs than the census of 1900.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 10, pp. 73–80*).—Statistics on the condition of crops in the United States and foreign countries, the farm values and range of prices of important crops and products, temperature and precipitation data, sugar-beet and beet-sugar production in the United States in 1910, durum wheat in 1910–11, cost of producing barley in important barley States, and monthly receipts and stocks of eggs and poultry in the United States are presented.

AGRICULTURAL EDUCATION.

Beginnings in agriculture, A. R. MANN (*New York, 1911, pp. XII+341, figs. 178*).—Based on the report of the committee of the National Education Association on industrial education in schools for rural communities, this text, another of the Rural Text-book Series edited by L. H. Bailey, treats the 4 sets of subjects recommended by that committee, viz: The affairs of agriculture, the soil, farming schemes and crops, and farm animals.

Part 1, dealing with the general agricultural situation, may be used as a series of introductory reading and discussion exercises. The actual work with subject matter begins with part 2 on such topics as the nature and composition of the soil, plant life in the soil, and the improvement of the soil. Part 3 deals with the dissemination and multiplication of plants, rotation of crops, various farm crops, the orchard, the wood crop, insect enemies and diseases of plants, as well as their improvement. Part 4 treats of the various farm animals in relation to their needs, feeds, types, breeds, and improvement. The appendix contains a list of elementary textbooks on agriculture, pamphlets, and publications of this Department which may be useful in supplementing the text.

New elementary agriculture, C. E. BESSEY, L. BRUNER, G. D. SWEZEY, ET AL (*Chicago and Lincoln, Nebr., 1911, 9. ed., pp. XVIII+209, figs. 62*).—In this revised edition a few errors in the first edition (E. S. R., 15, p. 626) have been corrected, all the plates have been carefully revised, and exercises and questions added.

Suggestions for the teaching of gardening ([*Gt. Brit.*] *Bd. Ed. Circ. 746, 1910, pp. 16*).—Suggestions are given to teachers and others as to how school gardening can be made educative as well as useful.

It is asserted that school gardening is a branch of nature study rather than a professional training for an industry. "But it is also—and this is what makes it particularly suitable for the education of children—a study which aims at producing visible and tangible results, which appeals to their practical and utilitarian instincts, and is closely connected with their domestic life."

The importance of maintaining an intimate and reciprocal relation between the garden work and the ordinary school work is pointed out, as well as the advantages claimed for the single, dual, and common plat systems. Short notes are also given dealing with some of the principal questions involved in successful gardening work.

The sequence of the seasons, G. A. BRICKER (*Ohio Ed. Mo., 60 (1911), No. 10, pp. 554–558, figs. 6*).—The author points out the relation of the seasons to farm work, and suggests that agricultural instruction should be timed accordingly.

Scheme of agricultural education ([*Lancaster, England*] *Ed. Dept., 1911, pp. 72, pls. 12*).—An outline is given of the scheme of agricultural education to be carried out in Lancaster County at the farm and dairy and poultry schools at Hutton, and the agricultural school at Harris Institute, Preston, as well as of miscellaneous work in the county.

School farming in Bukidnon, L. S. THOMAS (*Philippine Agr. Rev. [English Ed.]*, *4 (1911)*, *No. 7, pp. 349–355*).—This is an account of the garden work of the pupils in the Bukidnon schools and of the results obtained with the various native and foreign crops grown.

Agricultural instruction in the army, HORNY (*Ztschr. Agrarpolitik, 9 (1911)*, *No. 8, pp. 327–331*).—This is an account of the organization and methods of instruction in agriculture for soldiers under the jurisdiction of the Wiesbaden Chamber of Agriculture.

This instruction was introduced experimentally into the garrisons of the district in the winter of 1909–10. Ten lectures were delivered during each of the past two winters. The instruction was usually given weekly from 4 to 7 p. m. and consisted of the purely agricultural subjects such as crop and plant production, animal husbandry, farm management, combating weeds and insect enemies, as well as related subjects such as fruit growing, care of health, and administration of the law. In 1909–10 there were 354 soldiers in attendance on this course, and in the past winter, 298.

MISCELLANEOUS.

Twenty-third Annual Report of Massachusetts Station, 1910 (*Massachusetts Sta. Rpt. 1910, pts. 1, pp. 356, pls. 8, figs. 13; 2, pp. 95, fig. 1*).—Part 1 of this report contains the organization list, a report of the director, a financial statement for the fiscal year ended June 30, 1910, reports of heads of departments, and numerous special articles, among them a tribute by Dr. J. B. Lindsey to the late Dr. C. A. Goessmann. Part 2, which is the portion designed for general distribution, consists of papers of a popular nature, based on the results of the observations and experiments of the station, and of a brief summary by the director of the more important conclusions from these articles. The experimental work reported in each part of the report is for the most part abstracted elsewhere in this issue.

Report of the Royal Agricultural-Chemical Experiment Station at Vienna, 1910, F. W. DAFERT and K. KORNAUTH (*Ber. K. Landw. Chem. Vers. Stat. Wien, 1910, pp. 120*).—This report deals principally with official chemical-technological investigations, viticulture, dairying, horticulture, moor culture and peat valuation, fish culture, the distribution of Loeffler's mouse typhoid and rat bacillus cultures, and plant protection.

Monthly Bulletin of the Department Library, August and September, 1911 (*U. S. Dept. Agr., Library Mo. Bul., 2 (1911)*, *Nos. 8, pp. 209–234; 9, pp. 237–260*).—These numbers contain data for August and September, 1911, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

Experiment Station Work, LXV (*U. S. Dept. Agr., Farmers' Bul. 465, pp. 24, figs. 8*).—This number contains articles upon the following subjects: Cost of available nitrogen, management of marsh soils, a weeder harrow for dry farms, the V-shaped cotton-stalk cutter, storage for root crops, a danger in feeding root crops to breeding animals, sanitary care of swine in the South, individuality of the cow as a factor in economic milk production, and hatching and rearing turkeys by artificial methods.

NOTES.

Alabama College Station.—F. A. Wolf, Ph. D., has been appointed plant pathologist.

Georgia College.—Recent appointments, which became effective January 1, include L. M. Carter, of the state department of agriculture, as adjunct professor of soil chemistry; R. S. Hollingshead, of the New York State Department of Agriculture, as instructor in soil chemistry; D. D. Long as adjunct professor in soil survey work; and J. W. Firor, of the West Virginia Station, as instructor in horticulture. In connection with the extension work, L. E. Rast, a 1911 graduate of the college, has been appointed instructor in agronomy; J. L. Bishop adjunct professor in animal husbandry; Mary E. Creswell instructor in school extension work; and G. W. Firor secretary of the extension department.

Illinois University and Station.—Dr. H. P. Baker, of the Pennsylvania College and Station, has been appointed to the chair of forestry in the college of agriculture. Wilbur J. Fraser has resigned as head of the department of dairy husbandry in order to devote his entire time to a professorship which he will retain within the department.

Purdue University and Station.—A severe storm November 12 did much damage to several buildings, the greatest loss being in the destruction of the station seed house and the experimental sheep sheds. Some farm machinery was destroyed and considerable quantities of seed of improved strains were lost. It is estimated that the loss will be at least $20,000.

The departments of horticulture and entomology have been separated, Prof. James Troop becoming head of the new department of entomology and Prof. C. G. Woodbury head of that of horticulture. Recent appointments include H. R. Smalley (Purdue, 1911), as assistant chemist in the station, C. E. Brehm as instructor in horticulture, C. F. Gobble as instructor in animal husbandry, E. J. Petry as instructor in agronomy, J. E. Dougherty (Cornell, 1911), as assistant in poultry husbandry, and R. E. Caldwell as associate in milk production, vice P. H. Crane, resigned to accept a position with *Hoard's Dairyman*.

Massachusetts College and Station.—F. B. Jenks, assistant professor of agricultural education, has accepted a position with the United States Bureau of Education and has entered upon his duties. C. L. Perkins resigned as assistant chemist in the station, this taking effect December 23, 1911.

Minnesota University and Station.—T. P. Cooper has accepted an appointment as director of demonstration farm work for the One Hundred-Dollar an Acre Club of North Dakota, an organization made up mainly of bankers of the State with a view to increasing the value of farm lands by the introduction of improved methods. A number of ten-acre demonstration farms are projected for various parts of the State.

DeForest Hungerford has been appointed assistant in chemistry, and Robert B. Baxter animal husbandman at the Crookston substation.

Mississippi Station.—J. W. Fox, director and agronomist, has resigned to take effect January 1, to assume charge of a tract of Delta property of 32,000 acres for an English syndicate. He has been succeeded as director by E. R. Lloyd, who will also continue to be animal husbandman, and as agronomist by J. R.

Ricks, the assistant agronomist. A. B. McKay, horticulturist, has been given the additional duties of vice director. James Lewis has resigned as veterinarian and has been succeeded by Dr. E. M. Ranck.

Cornell University.—A new plan for the administration of the college of agriculture went into effect January 1. The general supervision of the college remains with the full board of trustees, but the more immediate oversight has been delegated to a special committee of 11, to be known as the Agricultural College Council. This council is made up of the 5 trustees appointed by the governor, the president of the university, the trustee elected by the State Grange, the state commissioner of agriculture, the president of the state agricultural society, and two trustees to be selected by the board of trustees, one of these being chosen from those elected by the alumni.

E. G. Montgomery, experimental agronomist of the Nebraska University and Station, has accepted the position of professor of field crops.

Pennsylvania Institute of Animal Nutrition.—K. K. Jones, a 1910 graduate of Fairmount College, has been appointed assistant in animal nutrition.

Porto Rico University.—R. I. Smith, of the North Carolina College and Station, E. A. Cockefair, professor of agriculture in the State Normal School at Cape Girardeau, Mo., and Arthur D. Cromwell and S. K. White, of Iowa, have accepted positions in connection with the extension work of the college of agriculture.

Texas College and Station.—Harper Dean and F. B. Paddock, of the college staff, have been appointed assistant entomologists in the station, the former giving his entire time to station work.

Association of Official Agricultural Chemists.—The twenty-eighth annual convention of this association was held November 22–24, 1911, in Washington, D. C., with an attendance of over 200 persons.

The president of the association, F. W. Woll, delivered the annual address, which dealt primarily with the historical development of the association. A comparison was made between what constituted agricultural chemistry in the early days and what it represents to-day, and attention was directed to the part played by members of the association in the advancement of this branch of science. Recommendations were also submitted for additional cooperative work.

On the invitation of the association Secretary of Agriculture Wilson delivered an address in which he pointed out the rôle played by agricultural chemists in the furtherance of the science of agriculture and the extent to which the processes which occur during plant growth and in the soil can be explained in the light of present-day chemistry. An invitation to participate in the International Congress of Applied Chemistry at its 1912 meeting in this country was presented by Dr. Wiley.

H. D. Haskins, referee on phosphoric acid, reported a study of the Wagner method and various modifications thereof as a means for determining the availability of phosphoric acid in basic slag. In this connection a résumé was given of work extending over a period of 15 years which has been done by various workers. After discussing the cooperative work of the various analysts, the referee also read a paper on work done at the Massachusetts Station in regard to the efficiency of different phosphates. The results in 9 out of 14 years of work brought out the fact that basic slag as a source of phosphoric acid was superior to both acid phosphate and dissolved bone black. On the recommendation of the referee and associate referee the Wagner method was adopted provisionally by the association.

The associate referee on phosphoric acid, A. J. Patten, discussed the use of the electrical conductivity method for determining the neutral point in preparing ammonium citrate solution. The method in his hands gave better results than the usual procedure.

The referee on nitrogen, J. W. Kellogg, made no definite report, but recommended that the method for determining available nitrogen be continued, and that the alkaline and neutral permanganate methods as applied to crude stock be further studied. E. L. Baker recommended on the basis of his results that a trial be made of the Salle method (E. S. R., 23, p. 213) for nitrates and nitrites in commercial nitrates.

As referee on potash, Mr. Baker reported cooperative work which was practically a repetition of that of last year with a few minor changes and which gave in general good results. He recommended that the study of the Drushel volumetric cobalti-nitrite method be discontinued and the gravimetric cobalti-nitrite method be studied, using in this connection the Itano method of precipitating out the phosphates before adding the reagents.

A paper submitted by M. A. Drushel on the estimation of potassium as cobalti-nitrite was read by L. L. Van Slyke, in which a plea was made for the retention of this method but applying it only to fertilizers containing less than 10 per cent of potash. L. T. Bowser also rendered a report on the cobalti-nitrite method. A resolution was introduced in connection with potash to make the factors for calculating from potassium platinic chlorid to potassium chlorid read 0.3067, to potassium sulphate to read 0.3585, and to potassium oxid to read 0.1938, and, furthermore, to make certain modifications in the official method.

J. G. Lipman and G. S. Fraps, referee and associate referee, respectively, on soils, reported giving some time to bacteriologic methods for determining soil acidity and also to the modified cobalti-nitrite method for potash and methods for humus determination. In the case of the latter it was pointed out that the official method for humus is less accurate than the Mooers-Hampton and the Rather methods (E. S. R., 25, p. 614). The referees recommended a further study of the Rather method and the elimination of the official method.

As the referee on inorganic plant constituents, O. M. Shedd reported on cooperative work done in regard to the molybdate method for separating ferric and aluminic oxids. Recommendations were made to adopt officially the molybdate method, to study further the oxalate method with a synthetic ash solution, and to study the Schreiber method (E. S. R., 23, p. 215) for total sulphur in organic matter. The referee on water, W. W. Skinner, in addition to giving the results of the cooperative work, advocated the adoption as official of methods proposed in Circular 52 of the Bureau of Chemistry (E. S. R., 22, p. 614).

C. C. McDonnell, the referee on insecticides, made several recommendations in regard to the chromate method for total lead oxid and lead arsenate, the gravimetric method for sulphur as sulphids and polysulphids in lime-sulphur wash, the volumetric method for sulphur present as thiosulphate in lime-sulphur solution, the arsenious and arsenic acid in London purple, and the Gatehouse method for determining chlorin in cyanids.

The referee on food adulteration, A. S. Mitchell, gave an outline of some of the work conducted during the past year by the associate referees and others. The associate referee on the adulteration of dairy products, A. E. Paul, pointed out the possibilities for fraud by the use of the homogenizer in the dairy and ice-cream industries, and also introduced a method for extracting fat from cream, ice-cream, evaporated milk, and sweetened condensed milk.

H. L. White, the associate referee on cereal products, reported cooperative work on 2 samples of wheat flour, one a straight flour produced from Fife wheat and the other a patent flour from durum wheat. This included baking tests, and a description of methods by B. R. Jacobs for making baking tests as used in the Bureau of Chemistry of this Department. There was much variation in the methods and the results of the baking tests.

The associate referee on water in foods, H. C. Lythgoe, stated that in many cases it was noted that a darkening of the sulphuric acid used in the vacuum method for determining water in foods takes place. In view of this he considers it advisable, as a recommendation for future work, to make a study of the method and to use various dehydrating agents for comparison.

C. R. Moulton, as the referee on the separation of meat proteins, reported cooperative work in regard to the determination of nitrogen in concentrated beef extracts. A further study of this problem was recommended.

The report of A. W. Bosworth, associate referee on the separation of the nitrogenous bodies of milk and cheese, presented by L. L. Van Slyke, discussed the results of a study of the Folin method (E. S. R., 24, p. 703) for determining ammonia in cheese and dairy products, and the D. D. Van Slyke method (E. S. R., 25, p. 710) for the determination of amino acid nitrogen in regard to its application to dairy products. The results obtained with both of the methods were comparatively good, and it was recommended that a further study of them be made.

The referee on foods and feeding stuffs, G. M. MacNider, reported on the determination of acidity in feeds, a comparison of the proposed modification of the method for the determination of crude fiber with the official method, and a comparison of the official ethyl ether method for determining fat with the petroleum ether method. Recommendations were made to report the acidity in feeds in terms of cubic centimeters of sodium hydrate used, or its equivalent in grams of sodium hydrate; that a study of the factor for converting nitrogen into protein be made; that the petroleum ether method for fat in cotton-seed products be recognized by the association; and that the proposed modification of the official crude fiber method be not further considered.

The reports of the following referees and associate referees were also rendered: R. W. Hilts on spices, W. E. Mathewson on colors, W. A. Bender on vinegars, R. S. Hiltner on flavoring extracts, cocoa, and cacao products by W. L. Dubois, tea and coffee by M. E. Jaffa, preservatives by H. E. Barnard, fats and oils by H. S. Bailey, sugar and molasses by W. E. Cross, meat and fish by R. Hoagland, fruit and fruit products by A. W. Blair, medicinal plants and drugs by L. F. Kebler, tannin by J. S. Rogers, headache mixtures by W. O. Emery, and medicated soft drinks by H. C. Fuller.

The following papers were presented during the session: The Determination of Carbon Dioxid in Soils, by L. T. Bowser; The Ether Extract of Paprika and Pimenton, by D. L. Weatherhead; Recalculation of Juckenack's Egg Noodle Tables, by R. W. Hilts; Determination of Tin in Foods, by A. W. Hansen and L. C. Johnson; On the Chemical Composition of Authentic Vanilla Extracts, together with Analytical Methods and Limits of Constants, by A. L. Winton and E. H. Berry; Methods of Analyses of Fruit Products, by A. E. Paul; Potash Determination in Ashes, by P. F. Trowbridge; Method for the Analysis of Cattle Foods (Sugar), by H. Bryan, M. N. Straughn, and A. Given; Note on a Tentative Method for the Determination of Essential Oil in Alcoholic Solutions, by R. S. Hiltner; Note on the Determination of Benzaldehyde in Liquors, Distilled Liquors, and Cordials, by F. G. Smith; and Temperature Corrections in Raw Sugar Polarization, by W. D. Horne.

The committee on amendments to the constitution reported favorably a resolution introduced by W. A. Withers recommending that the referees and associate referees be appointed by the outgoing executive committee, and, furthermore, that the association provide a place on the program for the announcement of the appointment of referees and associates referees. The plan has for its purpose the expedition of cooperative work. The association also adopted a resolution presented by O. M. Shedd that the retiring referees transmit a copy of their reports and recommendations to the incoming referees, together with a statement of the action taken by the association.

In regard to the proposed affiliation of societies organized for the purpose of advancing agricultural science, Dr. Wiley pointed out to the association the desirability of joining in the movement. Certain rules which exist in the association by-laws, however, conflict somewhat with the stipulations proposed for the organization of the new society.

The committee on the standardization of alcohol tables, and that on the proposed agricultural scientific journal, were discharged.

The officers elected for the next year are: President, H. J. Patterson, College Park, Md.; vice-president, G. S. Fraps, College Station, Tex.; secretary-treasurer, H. W. Wiley, Washington, D. C.; and as additional members of the executive committee, R. E. Doolittle, Washington, D. C., and A. J. Patten, of East Lansing, Mich.

Necrology.—Edouard André, editor-in-chief of the *Revue Horticole* since 1882 and professor of garden architecture at l'Ecole Nationale d'Horticulture of Versailles since 1892, when the chair was established on his behalf, died October 25 at La Croix (Indre-et-Loire), at the age of 71 years. Professor André made many contributions to horticultural literature, the best known of which is the classic l'Art des Jardins. He was a garden architect of international repute and is also well known for his extensive botanical collections made in South America. As a result of his voyages to Uruguay in 1890, Professor André collected many plants of value to horticulture, many of which have since been extensively cultivated. He was a member of the leading botanical and horticultural societies at home and abroad and was an officer of the Legion of Honor.

A recent number of the *Journal d'Agriculture Practique* notes the death on October 5, at the age of 84, of Dr. Samuel Bieler, director of the Cantonal Agricultural School at Lausanne. In his long and active career he devoted much time to studies in zootechny and animal husbandry and left many valuable memoirs. In 1898 he was organizer and secretary-general of the fifth International Congress of Agriculture, which was held at Lausanne.

Sir Joseph Dalton Hooker, the Nestor of English botanists, died December 10, 1911, in his ninety-fifth year. His great reputation rests mainly on his work in connection with systematic botany, but his contributions to the geographical distribution of plants have been numerous and valuable.

The recent death at Narbonne is noted of Gaston Gautier at the age of 70 years. He was a member of Société de Botanique de France and had published several botanical memoirs. His best known undertaking was the reclamation of the pestilential swamps surrounding Narbonne and their conversion into vineyards.

G. H. Verrall, the eminent English dipterist and a former president of the Entomological Society of London, died September 16 at the age of 64 years.

EXPERIMENT STATION RECORD.

VOL. XXVI. FEBRUARY, 1912. No. 2.

Attention has already been directed in these columns to the comprehensive efforts for agricultural development which have been initiated in Great Britain under the provisions of the Development and Road Improvement Funds Act of 1909, and to their great prospective significance for all workers in agricultural science (E. S. R., 24, p. 201). The period which has since elapsed has been productive of additional progress in the formulation of policies, the allotment of funds, and the actual commencement of a number of specific lines of work, and the enterprise in its present status reveals several aspects of general interest.

It will be recalled that under the provisions of the Development Act a sum of $2,500,000 per annum has been available since April 1, 1910, for aiding and developing agriculture and rural industries, forestry, land reclamation and drainage, the improvement of rural transportation, harbors and inland navigation, and the fisheries, and other purposes calculated to promote the economic development of the United Kingdom. Its administration rests with a board of eight Development Commissioners, who may recommend either grants or loans to government departments such as the Board of Agriculture and Fisheries or the Board of Education, or through some department to educational or other public institutions and to associations not trading for profit.

Much interest has from the first been manifested in Great Britain in the act and its possibilities, and as the scope of the work which may be instituted under it is very comprehensive the demands for funds have far exceeded the resources available. Fortunately, however, wide discretionary powers are vested in the commissioners, so that the selection of the lines of work to be undertaken has largely been determined by them. A report recently issued, covering the first nine months of their operations, affords an indication of their policies and the directions along which development is at present proposed.

It appears that up to March 31, 1911, one hundred and seventy applications for advances from the fund were received by the Treasury Department, and, of these, twenty-four officially reached the commissioners for action. These included a great variety of subjects, ranging from small local items, such as the maintenance of a harbor,

to elaborate measures for the institution of a national system of agricultural research. From among these applications, definite approvals were rendered to include about one-third of the annual income for the five years to which the appropriations are restricted. Considerable preliminary work was also completed in the allocation of the remaining funds, and additional grants have subsequently been announced.

Although the benefits of the act are by no means restricted to development in agriculture, an examination of the report reveals the predominant position accorded the industry, grants for other purposes being as yet relatively insignificant. This action, it may be concluded, indicates a deep appreciation of the importance of agriculture to the nation, a belief in the feasibility of government aid to the industry, and a conviction as to the economic advantages to the government to be derived from such aid.

The commissioners announce that as regards agriculture they propose to devote their attention principally to three lines of action. They aim first at increasing the amount and quality of production, by aiding in the extension of a system of scientific investigation and research and a system of education to bring the results into practice; secondly, at increasing the variety of production, by determining what new crops and industries can be added with reasonable probability of profit; and, thirdly, at encouraging the organization of cooperative enterprises. They also propose to stimulate forestry development, but consider the first step in this work to be the formation of a trained body of foresters.

As regards the promotion of specific industries and products, a number of grants have been approved. The first was one of about $200,000 for the encouragement of light horse breeding in Great Britain, and another allotted $50,000 to horse breeding in Ireland. Advances of from $125,000 to $150,000 for the purchase of land in Ireland for afforestation purposes have been agreed to, and investigations are being made by scientific experts as to the propriety of expenditures in encouragement of flax, hemp, tobacco, and sugar-beet growing.

It is of interest to note that one principle upon which the commissioners are insisting to applicants is that in all cases there be submitted a definite plan of operations. This is somewhat analogous to the project method which is becoming increasingly adopted in this country. The commissioners state that "some applications have tended to be little more than a statement of the desirability of spending money for some purpose, accompanied by a request for a grant to be spent at the discretion of the applicant in promoting that purpose. A reasonable elasticity in the details of schemes is of course quite legitimate, particularly when the schemes are in the nature of breaking new ground; and the commissioners do not expect the destination of a grant or loan to be fixed down to the last penny be-

fore anything is spent. But they are not prepared . . . to recommend the expenditure of public money till the lines of a scheme and estimates of its cost have been prepared and approved in some detail."

By far the larger proportion of the funds allotted are assigned to agricultural research and instruction. In the opinion of a reviewer of the report in *Nature*, the commissioners have "set scientific matters in the forefront of their program. Indeed, they indicate that until they have dealt with research and education they intend to postpone the consideration of projects aiming at the direct creation of employment, such as the reclamation of land, canals, and light railways, and afforestation of land." *Nature* heartily commends this attitude, asserting with reference to the undertaking of research that "there can be little doubt but that the expenditure will be recouped a thousandfold, because it will take effect upon the mind of the men who have to live by the industry."

The formulation of a comprehensive policy covering the whole field of agricultural research and the needs of the entire kingdom was an early subject of consideration by the commissioners, who have now declared definitely for the adoption of such a policy as compared with one of "piecemeal grants." As they state, "numerous applications for advances from the Development Fund for different branches of research and pieces of research work were expected, and have, in fact, been made by bodies, institutions, and associations all over the kingdom. It seemed to the commissioners that there would inevitably be waste of energy and money if these applications were simply taken one by one as they arrived, and advances recommended to those institutions which made out a good case for themselves, irrespective of other institutions and the work done by them. It is probably neither desirable nor possible to prevent all overlapping and duplication of work, and the commissioners realize that individual investigators and institutions can not and ought not to be dragooned into uncongenial tasks. But looking to the vast amount of work still to be done, they think that any advances from the fund for this purpose should be made on a coherent and comprehensive scheme, covering as wide an area as possible."

An application for an advance of $250,000 per annum was submitted to the commissioners by the Board of Agriculture and Fisheries for the organization of a system of scientific research and experiments in the science, methods, and practice of agriculture and the promotion of technical advice to farmers. In response to this the expenditure of $165,000 per annum for research alone has already been authorized, and a tentative plan for the initiation of the work has been agreed upon.

The scheme approved by the commissioners provides for research in eleven groups of subjects, covering more or less completely the

whole field of agriculture. Work in each group will be concentrated at one, or in some cases two, agricultural research institutions. Special investigations for which provision can not be made at one of these institutions will be carried on by means of separate grants. The funds available are expected to provide aid at present for two research institutions for plant breeding, two for animal pathology, two for agricultural zoology, one research institution and two or three local experimental gardens for fruit growing, and one institution each for plant physiology, plant nutrition and soil problems, animal nutrition, dairying, and the economics of agriculture. An institution for animal breeding is ultimately contemplated, but operations at present will be confined to one or two small grants.

The research institutions are to be selected from the universities, colleges, or similar existing agencies, preference being given to those already possessing special facilities for a given line of work. The grants are to be annual in duration, but it is intended to secure continuity in work and to employ permanent staffs. The institutions are expected to contribute from their own funds for the maintenance of the work and for the provision of buildings, laboratories, or equipment, though grants covering fifty per cent of the cost may be contributed from the fund under certain conditions. Cooperation with other institutions is to be encouraged, and duplication of work reduced to a minimum.

The publication of results is apparently to be largely through the scientific journals, rather than directly by the institutions in the form of bulletins or reports. Popular abstracts are in all cases to be furnished to the *Journal of the Board of Agriculture* for the information of farmers and the general public.

Great importance is attached to the provision of a local staff available for advisory work and for conducting local tests of the results of the research work under field conditions, and the dissemination among the farmers of the improved methods which may be discovered. It is hoped that the local advisory staff stationed at centers distributed through the country will form a link between the research institutions on the one hand and the practical farmer on the other.

A sum not exceeding $15,000 per annum is also to be available for special investigations not otherwise provided for. These are to be conducted under the auspices of existing institutions and utilizing their facilities so far as possible. Pending the selection of the research institutions, interim grants have been allotted to a number of institutions for approved lines of investigation. Among these may be cited $20,000 to Cambridge University, $10,000 for the Rothamsted experiments, and smaller grants to Bristol University, University College, Reading, the Southeastern Agricultural College, and the Woburn Experimental Station.

The process of organization of the research work has already revealed as one of the principal difficulties the scarcity of trained investigators. "Nothing has impressed the commissioners more than the clearness with which the fact has appeared that the first condition of any considerable progress in these ways is the creation of a trained staff. It is useless to expect that immediate results of real value can be obtained on a large scale merely by expenditure. . . . The number of men really qualified to conduct agricultural research in this country is at present exceedingly small, and it obviously can not be increased at a moment's notice."

With a view to remedying this condition so far as possible, a portion of the fund is being utilized for scholarships in agricultural science. Twelve scholarships of $750 each per annum have been established, mostly at Cambridge University, these being tenable for three years.

The encouragement of agricultural instruction and extension has also been favored in other grants from the fund. One of these set aside a sum not to exceed $1,625,000 for use to March 31, 1916, in agricultural education under the auspices of county education authorities. This grant has been temporarily withdrawn, pending a readjustment of certain administrative details, but it is expected that it will eventually be utilized for providing county staffs of agricultural instructors, working from headquarters termed "farm institutes." These institutes will provide demonstrations, short courses both at the headquarters and in traveling schools, and otherwise be at the disposal of the farmers of the region.

A grant of $60,000 per annum is also available for more technical advice and the investigation of local agricultural problems. This fund is to be administered by the Board of Agriculture and Fisheries, through not to exceed 12 approved universities and colleges in England and Wales. The men thus employed will be officers of the colleges and represent them officially in the dissemination of results.

From this survey it will be apparent that an important experiment as to the ways and means of governmental aid to agriculture is being undertaken, and that the plan which is undergoing trial presents many novel features. In Great Britain, although the careful consideration which has been accorded to the manifold questions involved in the disposition of the fund has necessarily retarded the commencement of active operations, the policy of the commissioners to proceed in a conservative and thoroughgoing way has received general commendation from scientists, the farmers themselves, and the general public. Well-considered plans have thereby been matured and a substantial foundation has been put in place. Now that the erection of the substructure is under way, there will be continued interest among all who are concerned with the upbuilding of agriculture, and further developments will be awaited with much anticipation.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Biochemical hand lexicon, edited by E. ABDERHALDEN (*Biochemisches Handlexikon. Berlin, 1911, vols. 1, pt. 1, pp. XVIII+704; pt. 2, pp. 705–1499; 2, pp. V+729; 3, pp. 341; 4, pp. VI+1190; 6, pp. VI+390; 7, pt. 1, pp. 538*).—This extensive work deals with the chemical, physical, and physiological properties of practically all known organic bodies which occur in nature or which have a relation in one way or another to biological processes.

Volume 1, part 1, deals with carbon, hydrocarbons, alcohols of the aliphatic series, and phenols, and part 2 with the alcohols of the aromatic series, aldehydes, ketones, acids, and heterocyclic compounds. The second volume treats of gums, hemicelluloses, plant slimes, pectins, humin bodies, starches, dextrins, inulins, celluloses, glycogen, the simple sugars, nitrogen-containing carbohydrates, glucoses, and glucosids. Volume 3 deals with the waxes, fats, phosphatids, protagon, cerebrosids and related bodies, stearins, and biliary acids. The topics treated in volume 4 are polypeptids, amino acids, nitrogen-containing derivatives of proteins and associated compounds, nucleo-proteids, nucleic acids, purin bodies, pyrimidin bases, sulphur-containing compounds, and proteins. Volume 5 has already been noted (E. S. R., 25, p. 107). Volume 6 discusses coloring matter of plants and of the animal world, and volume 7, part 1, tannins, lichen substances, saponins, bitter substances, and terpenes.

Handbook of biochemical methods, edited by E. ABDERHALDEN (*Handbuch der Biochemischen Arbeitsmethoden. Berlin and Vienna, 1910–11, vols. 3, pt. 1, pp. XXXII+706; pt. 2, pp. 707–1368, figs. 413; 4, pp. XVI+699–1527, figs. 16; 5, pt. 1, pp, 672, figs. 168*).—This extensive work of which volumes 1 and 2 have been previously noted (E. S. R., 23, p. 410) deals with practically all the chemical and biological methods of importance employed in animal and vegetable, physiological and pathological research, and constitutes a most comprehensive summary of data pertaining to biological problems and their solution.

The chemical differentiation of species, MURIEL WHELDALE (*Bio-Chem. Jour., 5 (1911), No. 10, pp. 445–456, pl. 1*).—The author here discusses the question of determining allied species and genera in plants by the chemical compounds peculiar to the respective species or genera.

Mechanisms of cell activity, C. L. ALSBERG (*Science, n. ser., 34 (1911), No. 865, pp. 97–105*).—A critical discussion in regard to chemical and physical principles which play a part in the cellular mechanism.

The centenary of glucose and the early history of starch, B. HERSTEIN (*Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 158–168*).—This is a discussion in regard to the history of starch, dextrin, and glucose.

Hydrocarbons of vegetable origin, T. KLOBB, J. GARNIER and R. EHRWEIN (*Bul. Soc. Chim. France, 4. ser., 7 (1910), No. 20–21, pp. 940–950; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 578, II, pp. 1100, 1101*).—This is a description of a method for isolating hydrocarbons occurring in plants.

The plant material is usually extracted with either cold or warm light petroleum-ether, and the extract which remains after evaporating off the solvent

dissolved in boiling acetone. The hot acetone solution is filtered, from which on cooling the hydrocarbons separate out. The hydrocarbons are purified, when necessary, by boiling with potassium hydrate in alcohol and recrystallizing from acetone. An alternative process is also described.

A number of hydrocarbons present in the flowers of *Arnica montana*, *Matricaria chamomilla*, *Antennaria dioica*, *Artemisia maritima*, *Tussilago farfara*, and *Tilia europea* are characterized and a formula assigned to them.

[Action of hydracids and hydrolyzing agents on starch], W. O. De Coninck (*Acad. Roy. Belg., Bul. Cl. Sci., 1910, Nos. 6, pp. 515–517; 7, pp. 586, 587; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 576, I, p. 655*).—It was found that a mixture containing 3 gm. of starch, from 35 to 40 gm. of water, and 2 cc. of concentrated hydrochloric acid, when held at 14° C. will reduce Fehling's solution only slightly after 3 days and markedly after 6 days. The hydrolysis is more active at 100°. Concentrated hydriodic or hydrobromic acids act similarly at ordinary temperatures, while a dilute solution of the former will hydrolyze at a higher temperature.

"The following substances dissolved, or suspended, in water also hydrolyze starch: Ferric, platinic, auric, and stannous chlorids; chlorin; potassium ferrocyanid, ferricyanid, dichromate, and hydroxid; sodium hydroxid, hydrogen carbonate, and dichromate; ammonium, lithium, barium, strontium, and calcium hydroxids; cupric sulphate; cobalt nitrate; nitric (dilute), chromic (dilute), acetic, tartaric, benzoic, picric, and other organic acids."

Stachydrin and other bases present in stachys tubers and in citrus leaves, E. Schulze and G. Trier (*Ztschr. Physiol. Chem., 67 (1910), No. 1, pp. 59–96; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 574, II, pp. 743, 744*).—After detailing the method for isolating stachydrin from the tubers of *Stachys tuberifera* and the foliage of *Citrus aurantium*, the authors point out that from the former a yield of 0.18 per cent of base, calculated from the dry substance, and small amounts of arginin, cholin, trigonellin, alloxuric bases, glutamin, and tyrosin were obtained. Citrus leaves yield about the same amount of base, and cholin and alloxuric bases are also present. The chemical and physical properties of stachydrin as obtained from the above sources are given.

The reactions of saponin, O. Reichard (*Pharm. Zentralhalle, 51 (1910), No. 52, pp. 1199–1204; abs. in Chem. Abs., 5 (1911), No. 5, p. 969*).—This is a description of various reagents and reactions for this substance.

A method for the study of proteolytic ferments, P. A. Kober (*Jour. Biol. Chem., 10 (1911), No. 1, pp. 9–14*).—This preliminary paper contains results of experiments on which the author hopes to base a method for following the action of ferments upon peptones and synthetic polypeptids. Essentially it consists in making copper salts of the neutral digestive mixtures, bringing them to the boiling point, and adding a small amount of alkali. Where amino acids are present an immediate precipitate of copper hydrate will be produced, which is directly proportional to the amount of amino acids present. The author thus far has tried 6 amino acids, which were found to adapt themselves to the technic admirably.

Question as to the identity of pepsin and chymosin, W. Sawitsch (*Ztschr. Physiol. Chem., 68 (1910), No. 1, pp. 12–25; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 576, II, p. 876*).—The author points out that with Hammarsten's method for isolating pepsin the chymosin is not destroyed but its activity is so altered that it shows a negative coagulating property. The rennin from calves when kept in a thermostat becomes so changed that it resembles Bang's parachymosin. Ferment solutions obtained from various animals had different properties, but from this it does not follow that the pepsins from all animals are not alike, as the only difference lies in the amount of resistance or reactivity.

Apparatus for the extraction of fresh plants with boiling alcohol, E. Bourquelot and H. Hérissey (*Jour. Pharm. et Chim., 7. ser., 3 (1911), No. 4, pp. 145–149, fig. 1; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 5, p. 306, fig. 1*).—An illustrated description of an apparatus for rapidly extracting fresh plants with boiling alcohol.

A very sensitive indicator, J. F. Sacher (*Chem. Ztg., 34 (1910), No. 134, pp. 1192, 1193; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 578, II, p. 1106*).—The author makes use of an extract of radish skins in 96 per cent alcohol (1 part by weight of skins to 1 part alcohol). If the solution is acid to litmus paper it is carefully neutralized with seminormal potassium hydroxid solution. With alkalis the indicator is green and with acid it is intensely red. It is, according to the author, more sensitive than either methyl orange or phenolphthalein, but like the latter it is sensitive to carbon dioxid.

Estimation of nitrates, Clarens (*Jour. Pharm. et Chim., 7. ser., 1 (1910), No. 12, pp. 589–593; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 574, II, p. 752*).—This method is based on the reduction of nitric acid by mercury or powdered copper in the cold. The nitric oxid thus produced is measured.

A simple method for detecting nitrites, Dané (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 8, pp. 354, 355; abs. in Chem. Zentbl., 1911, I, No. 25, p. 1763*).—The reagent consists of 0.02 gm. of synthetic indol in 150 cc. of 95 per cent alcohol.

[Cooperative work on phosphoric acid and potash by the division of fertilizer chemists of the American Chemical Society], J. E. Breckenridge et al. (*Jour. Indus. and Engin. Chem., 3 (1911), No. 2, pp. 118–120*).—A description of the methods used and the list and results of the analysts in the cooperative work for 1910.

Estimation of potassium as potassium platinic-chlorid, H. Fresenius and P. H. M. P. Brinton (*Ztschr. Analyt. Chem., 50 (1911), No. 1, pp. 21–35; abs. in Analyst, 36 (1911), No. 421, p. 178*).—This is an amplification of work previously noted (E. S. R., 25, p. 107).

In regard to determining phosphoric acid, G. Jörgensen (*Ztschr. Angew. Chem., 24 (1911), No. 12, pp. 542–544*).—In a reply to von Lorenz (E. S. R., 25, p. 107) the author gives the historical facts in regard to the introduction of his method for determining phosphoric acid.

A volumetric estimation of phosphoric acid, J. Rosin (*Jour. Amer. Chem. Soc., 33 (1911), No. 7, pp. 1099–1104*).—Although the Holleman method (E. S. R., 6, p. 15) according to the author, yields better results than either the Perrot[1] . . . or Lieberman methods[2] . . . the figures obtained are far from satisfactory. The reaction which is supposed to take place is, according to the author, incorrect and may be more closely represented by the equation $3Na_2HPO_4+6AgNO_3=2Ag_3PO_4+6NaNO_3+H_4PO_4$. This was confirmed by experiment.

"The method as finally adopted, and which has given good results, is as follows: The solution of the phosphoric acid contained in a graduated (200 cc.) flask is neutralized, if necessary, to phenolphthalein, with caustic soda free from chlorid, an excess of tenth-normal silver nitrate added and the mixture well shaken. Zinc oxid, or a suspension of it in water, is then added little by little, shaking vigorously for 2 or 3 minutes after each addition and testing for free acid each time by dropping in a very small piece of blue litmus paper. When the color of the litmus paper is no longer affected, the solution is made

[1] Jour. Soc. Chem. Indus., 7 (1888), p. 311.
[2] Analyst, 34 (1909), p. 361.

up with water to the mark, well mixed, and allowed to subside for a few minutes. It is then filtered through a dry filter and the excess of the silver determined in an aliquot portion of the filtrate (100 cc.) by Volhard's method."

Detection of small quantities of sulphur in inorganic and organic compounds, E. DEUSSEN (*Ztschr. Angew. Chem., 23 (1910), No. 27, pp. 1258–1260; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 574, II, p. 750*).—The substance under examination, for example, 2 barley berries, is pulverized and mixed with 0.1 gm. sodium carbonate and small cuttings or scrapings of a 9 cm. diameter filter paper, to the mixture is added a few cubic centimeters of water, and the mass dried over an alcohol flame. The dry residue thus obtained is titurated with a pestle, with 0.2 gm. of sodium carbonate. The mixture is then transferred to an extraction thimble or cartridge, which is wound around three or four times with a platinum wire attached to a glass rod, and the whole heated for from 6 to 10 minutes in the inner flame of a blowpipe heated by Kahlbaum's molecular benzene. The fused mass so obtained is dissolved in water and the filtrate therefrom examined for sulphid by means of alkaline lead solution (10 drops of normal lead solution, 70 cc. of water, and 20 cc. of normal sodium hydroxid solution). The process is modified somewhat when fluorids are present.

Gravimetric estimation of sulphuric acid in the presence of alkali metals, Y. KATO and I. NODA (*Mem. Col. Sci. Engin. Kyōtō, 2 (1909–10), pp. 217–228; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 576, II, p. 895*).—"The concentration of a seminormal solution of sulphuric acid was determined gravimetrically both in the absence of, and in the presence of, equivalent solutions of the chlorids of potassium, sodium, and ammonium. Determinations were also made with varying concentrations of the haloid salts, and with more dilute solutions of sulphuric acid.

"Potassium chlorid caused the greatest error in the determination. The ratio (R) of salt to acid and the percentage difference (D) between the results obtained in the absence of, and in the presence of, potassium chlorid are connected by the equation: $\log D = n \log R + K$, where K is a constant. This is similar to the ordinary adsorption formula, so that it is probable that potassium sulphate is adsorbed during the precipitation of the barium sulphate. Adsorption is diminished, but not completely, by diluting the solution. No adsorption takes place in the presence of magnesium chlorid."

Volumetric estimation of manganese, Z. KARAOGLANOFF (*Ztschr. Analyt. Chem., 49 (1910), No. 7, pp. 419–424; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 574, II, p. 754*).—This is a modification of Volhard's method (hot titration of manganous sulphate with permanganate in presence of zinc sulphate), which does not yield good results when iron is present. If nitrate is taken instead of sulphate and about two or three times as much ferric nitrate, or, better still silver nitrate, is added, the results with the method are good. Free nitric acid or zinc, aluminum or barium nitrates, or titrating without an additional salt cause inaccurate results.

Analysis of calcium cyanamid, A. MONNIER (*Chem. Ztg., 35 (1911), No. 67, pp. 601, 602; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 13, pp. 821, 822*).—The cyanamid nitrogen was determined by the Friderich method, which is based on the conversion of the cyanamid into urea by the agencies of acids, as follows: "One gm. of the fertilizer is agitated for 2½ hours with 100 cc. of water, the mixture filtered, and 25 cc. of the filtrate, with addition of 10 cc. of formic acid, are evaporated nearly to dryness; the residue is taken up with 25 cc. of water, and 10 cc. of the solution are treated with sodium hypobromite in a ureometer, comparison being made with a 0.5 per cent solution of pure urea."

According to the author, Caro's method yields low results. A sample of newly made calcium cyanamid on analysis yielded the following: "Total nitrogen by the salicylic acid method, 21.5 per cent; nitrogen, by the usual Kjeldahl process, 20.5; nitrogen, as cyanamid, by the above method, 18.98 per cent."

A study of the phenolsulphonic acid method for the determination of nitrates in water.—A modified phenolsulphonic acid method, E. M. CHAMOT, D. S. PRATT and H. W. REDFIELD (*Jour. Amer. Chem. Soc., 33 (1911), No. 3, pp. 381–384*).—After trying several methods for preparing the phenolsulphonic acid reagent, the authors suggest the following: "Dissolve 25 gm. of pure white phenol in 150 cc. of pure concentrated sulphuric acid, and 75 cc. of fuming sulphuric acid (13 per cent SO_3), stir well, and heat for 2 hours at about 100°." They state that the reagent thus prepared contained no mono or tri acids.

In determining nitrates it is necessary to determine first the chlorin and nitrite content and the color, then "measure into an evaporator 100 cc. of the sample, or if the nitrates are very high, such a volume as will contain about 10 parts per million of nitric nitrogen, fairly low colorimeter readings having been found most reliable. Add sufficient $\frac{1}{25}$ normal or $\frac{1}{50}$ normal sulphuric acid to not quite neutralize all the alkalinity, then a volume of standard solution of silver sulphate free from nitrate (4.3969 gm. per liter, 1 cc.=1 cc. of standard silver nitrate solution=1 mg. Cl per cc.), which will precipitate all but about 0.5 mg. of the chlorin. Heat to boiling, add a little 'aluminum cream,' filter, and wash with small amounts of hot water. Evaporate the filtrates to dryness, add 2 cc. of the disulphonic acid reagent, rubbing with a glass rod to insure intimate contact. Should the residue be compact or vitreous in appearance from much magnesium or much iron present, place the evaporator on the water bath for a few minutes. Dilute with distilled water and add slowly a strong solution of potassium hydroxid (10 to 12 normal) until the maximum color is developed. Transfer to a colorimeter cylinder, filtering if necessary, and compare with a potassium nitrate or tripotassium nitrophenoldisulphonate standard."

If nitrites are present in excess of 1 part per million of nitrogen a slight error is introduced, which may be removed by heating the sample under examination a few minutes with a few drops of hydrogen peroxid free from nitrates, or adding a dilute solution of potassium permanganate in the cold until a pink tint appears. A correction is then applied to the final nitrate determination.

The authors present some notes on the preparation of tripotassium nitrophenoldisulphonate for preparing colorimetric standards.

Volhard's method for the estimation of chlorin in potable waters, A. T. STUART (*Jour. Amer. Chem. Soc., 33 (1911), No. 8, pp. 1344–1349, figs. 2*).—The method when used for drinking water where the chromate method is inapplicable, as for instance in peaty waters, can only be used when a very small excess of silver nitrate solution is added, not greater than 0.2 cc. (1 cc.= 0.001 gm. Cl). The plus or minus error for water containing about 10 parts per million of chlorin will be within 0.5 part per million. Aqueous solutions containing more than the ordinary concentrations of chlorin showed quite a noticeable variation, which, however, was not serious enough to interfere with the practicability of the method.

Suggestions on micro-analytical methods for the examination of drugs, foods, and spices, A. SCHNEIDER (*Merck's Rpt., 20 (1911), Nos. 2, pp. 33–35; 4, pp. 91–93; 6, pp. 159–161, figs. 3*).—This is a detailed description of microscopical methods.

The examination of turtle meat for adulteration, F. YOSHINAGA (*München. Med. Wchnschr., 56 (1909), No. 49, p. 2526; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 5, p. 118*).—The author was able to determine by the precipitin

method whether turtle meat (*Clemmys japonica*) was adulterated with frog meat (*Tyronix japonicus*).

Determination of cacao shells in cocoa powder, W. L. DUBOIS and C. I. LOTT (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, pp. 251, 252*).—According to the authors, the Goske method is faulty and does not indicate with accuracy an addition of less than 5 per cent of cacao shells. See also a previous note (E. S. R., 24, p. 123).

The detection of prune juice and caramel in vanilla flavoring extracts, W. DENIS (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, pp. 254, 255*).—The lead acetate test for detecting caramel in vanilla, according to this author, often yields anomalous results when applied to commercial extracts containing no resins or color soluble in amyl alcohol or ether. Such extracts usually have a high vanillin content. The method was therefore modified and at the same time was made applicable for detecting prune juice in such extracts. It is as follows:

"To 25 cc. vanilla extract contained in a 100 cc. beaker add 50 cc. water and evaporate on a steam bath to a volume of 20 cc., filter off the precipitated resins, and wash the filter with about 5 cc. water, the washings being allowed to mix with the filtrate. When cold, place in a small separatory funnel and extract twice with two 15 cc. portions of ether; the color of the first ether extract should always be noted; the coloring matter of the vanilla bean is fairly soluble in ether, caramel and prune juice are absolutely insoluble. Now draw off the aqueous liquid into a beaker and warm for a few minutes on the steam bath to get rid of the last traces of ether, cool, place in a 100 cc. graduated cylinder and add 1 cc. basic lead acetate of specific gravity 1.25, mix by inverting the cylinder two or three times and let stand until the precipitate settles.

"If caramel be present the precipitate will be dark brown in color, while the supernatant liquid will be dark colored also. After the color of the precipitate and liquid have been observed, add 5 cc. glacial acetic acid and shake; in the presence of a pure extract, or of an extract colored with caramel, the precipitate will immediately dissolve. If prune juice has been used, there will be obtained on the addition of basic lead acetate to the extract after removal of alcohol, resins, and vanillin in the manner above described a very voluminous dark colored precipitate, while the supernatant liquid will be almost or entirely colorless. On addition of 5 cc. glacial acetic acid to this precipitate it will be found that there is present a lead salt insoluble in acetic acid. This insoluble substance is of a gelatinous reddish-brown appearance, much resembling the precipitate of ferric hydroxid."

The modified LaWall method for the determination of sodium benzoate in catsups, W. D. MCABEE (*Jour. Indus. and Engin. Chem., 2 (1910), No. 12, pp. 544, 545*).—The method as modified by LaWall and Bradshaw was found to be very efficient.

A source of error in the detection and estimation of salicylic acid, H. PELLET (*Ann. Chim. Analyt., 15 (1910), No. 8, pp. 302–305; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 576, II, p. 906*).—As salicylic acid is a normal constituent of many fruits, and as a substance has been discovered by Backe (E. S. R., 23, p. 306) which gives reactions typical of salicylic acid, the author deems it necessary to determine the quantity of acid present in each article examined.

The methods of examining milk and dairy products, C. BARTHEL (*Die Methoden zur Untersuchung von Milch und Molkereiprodukten. Leipsic, 1911, 2. ed., rev. and enl., pp. VIII+309, figs. 67*).—This is a revision and enlargement of this work, the English edition of which has been noted (E. S. R., 23, p. 513).

Simple, accurate methods of milk analysis, J. L. MAYER (*Druggists Circ., 55 (1911), No. 4, pp. 185–187*).—In this article the author points out various methods for the analysis of milk, so simplified that they may be conducted in the ordinary drug store.

Composition of casein of woman's and cow's milk, E. ABDERHALDEN and L. LANGSTEIN (*Ztschr. Physiol. Chem., 66 (1910), No. 1–2, pp. 8–12; abs. in Chem. Abs., 4 (1910), No. 23, p. 3249*).—Casein from human milk on hydrolysis yielded the following figures when calculated on an ash-free basis: Phenylalanin 2.8, tyrosin 4.58, prolin 2.85, asparaginic acid 1.0, glutaminic acid 10.95, valin 1.3, leucin 8.8, and alanin 1.2 per cent. When these figures are compared with those obtained by hydrolyzing cow's casein it is noted that the figures for tyrosin and glutaminic acid are about the same, and that there is also a close similarity in regard to the rest of the substances. Glycocoll was never present.

The fermentation of citric acid in milk, A. W. BOSWORTH and M. J. PRUCHA (*Jour. Biol. Chem., 8 (1910), No. 6, pp. 479–482*).—Previously noted from another source (E. S. R., 24, p. 277).

A practical procedure for detecting the degree of decomposition of milk, H. BERTIN-SANS and E. GAUJOUX (*Rev. Hyg. et Pol. Sanit., 31 (1909), No. 9, pp. 866–874; abs. in Hyg. Rundschau, 20 (1910), No. 24, pp. 1354, 1355*).—The following method has been found superior to others: Twenty-five cc. of the milk is placed in a cylinder, and 6 drops of a 1:4,000 solution of pure methylene blue added. After shaking the mixture to and fro, it is stoppered with a cotton plug, brought into the water bath, and kept at a temperature of 40° C. If the color disappears before 15 minutes have elapsed the milk should be condemned.

Investigations in regard to catalase, W. D. KOOPER (*Milchw. Zentbl., 7 (1911), No. 6, pp. 264–271, fig. 1*).—As long as catalase tests are not conducted under the same conditions and with the same kind of apparatus, so long, according to the author, the results obtained for it will vary. The apparatuses considered in this article are the Lobeck, Funke, Henckel, and Koning. In all of these the standard is the amount of gas in cubic centimeters which is evolved in 2 hours from 5 cc. of a 1 per cent hydrogen peroxid solution by 15 cc. of milk at from 25 to 30° C.

The average figures obtained with the various forms of apparatus when compared were found to have the following relationship for fresh whole milk: Koning: Funke: Henckel: Lobeck=1:1.37:1.44:1.66. This does not hold good for buttermilk, sour milk, etc. The breed of animal from which the milk is obtained also affects the catalase figure. Milk which was obtained under sterile conditions and disinfected with chloroform was found to yield a low catalase figure, and according to this the greater portion of the catalase must be of bacterial origin. Another source of catalase is the dirt contained in milk. During butter making catalase remains behind in the buttermilk and is, therefore, not a direct constituent of the fat.

The catalase of cow's milk, A. FAITELOWITZ (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 5, p. 294*).—Some comments on the work noted above.

Ammonium salts of fatty acids (oleic, palmitic, stearic), and separation of oleic acid from saturated fatty acids (palmitic and stearic), P. FALCIOLA (*Gaz. Chim. Ital., 40 (1910), II, No. 3–4, pp. 217–229; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 24, p. 1462*).—The author prepared ammonium stearate by adding an excess of concentrated ammoniacal solution to a hot alcoholic solution of stearic acid and allowing it to cool. The normal salts thus formed were found to be very unstable, lost ammonia slowly at ordinary temperature, and by the action of water were converted into an acid salt.

Ammonium oleate could be obtained by passing dry ammonia into an ethereal solution of oleic acid. This salt with water forms a colloidal, gelatinous liquid, which can not be filtered through paper, and which froths when shaken with a large amount of water. It was much more soluble in alcohol than the stearate or palmitate. The author utilizes this fact for separating solid from liquid fatty acids as "at a little above 0° C., 100 cc. of absolute alcohol, rendered ammoniacal, will dissolve 31 gm. of ammonium oleate, but only 0.1 gm. of ammonium stearate and 0.5 gm. of ammonium palmitate.

"The proposed method is as follows: The mixed fatty acids are dissolved in a small quantity of warm ether, a current of ammonia gas is passed through the solution, and the latter is cooled to the ordinary temperature. After expelling the ether, the residue is agitated with about four times its volume of ammoniacal alcohol cooled to 0°C., and after breaking up any clots and cooling in melting ice, filtered with the aid of the pump, and the precipitate is washed with a small quantity of cooled alcohol. From the filtrate and precipitate the liquid and solid fatty acids respectively are separated in the usual manner. The method while not giving entirely exact results, is stated to be sufficiently accurate for technical purposes, and the author has used it for determining the liquid and solid fatty acids of tallow, lard, sesame oil, etc."

The saponification methods for edible fats, E. Poppe (*Separate from Verslag. en Meded. K. Vlaam. Acad. Taal en Letterk., 1910, pp. 58*).—This is a detailed description and discussion of practically all the saponification methods in existence. It is accompanied by analytical results of the author, etc.

Analyses of fats and the chemistry of fats, W. Fahrion (*Ztschr. Angew. Chem., 24 (1911), No. 6, pp. 241–254*).—This is a retrospect of the more important progress made in the chemistry of fats for the year 1910.

The estimation of essential oils, C. D. Howard (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, p. 252*).—The author points out that while the method previously proposed by him (E. S. R., 20, p. 113) will sometimes yield inaccurate results with mixtures containing certain essential oils, in the case of such oils as orange, lemon, wintergreen, and peppermint it is of considerable value. The procedure has been modified and is as follows:

"Transfer 20 cc. of the extract to a 4-oz. separatory funnel; in the case of preparations containing more than 5 per cent of oil, take but 10 cc. Add 50 cc. of water and (except in the case of oils of the type of cinnamon and clove) 2 drops of strong hydrochloric acid. Shake out with 3 portions of ether, using 15 cc., 10 cc., and 5 cc. After each extraction except the last, the ether solution may be run out into a small flask, which is kept stoppered if a series of determinations is being run simultaneously. The combined ether extracts are washed once with 10 cc. of ether-saturated water for removal of the bulk of the alcohol, then cautiously transferred to a 10 per cent milk bottle, rinsing the flask and tip of the funnel with an additional 2 or 3 cc. of ether. Attach a bulb tube to the stem of the bottle and connect with a filter pump, immerse the bottle in nearly boiling water, start the pump, and shake with a gentle rotary motion at first. When all danger of spirting has passed, shake violently, and toward the last immerse in boiling water for a few seconds, or until the application of a match flame demonstrates the complete elimination of the ether. The removal of most of the latter should require not more than 2 or 3 minutes. Finally add cold water and centrifuge. In the case of oils heavier than water, salt solution must be used as the floating agent, except with wintergreen, for which cold sulphuric acid (1:2) may be safely and most conveniently used."

See also a previous note by Hortvet and West (E. S. R., 21, p. 108).

The acid content of coconut oil, L. ALLEN (*Chem. Rev. Fett u. Harz Indus., 18 (1911), No. 5, pp. 112, 113; abs. in Ztschr. Angew. Chem., 24 (1911), No. 29, p. 1386*).—As it has become a custom in commerce to calculate the percentage of free-fatty acids as coconut oil fatty acids, the author points out the fact that the middle molecular weight of these acids has not been definitely established. On this account he recommends inserting the free-fatty acid figures in the report as such and to let the coconut oil fatty acid figure follow it.

A new method for determining oil adulteration by mineral or resin oils, A. E. OUTERBRIDGE, Jr. (*Chem. Engin., 14 (1911), No. 2, pp. 347, 348; Oil, Amer. Sup., 72 (1911), No. 1861, p. 155*).—Mineral oils, so-called whether de-bloomed or not, when present in vegetable oils can be detected by exposing them to the rays of the ordinary inclosed arc light. In this light the fluorescence of the mineral oil is highly intensified. Standards, according to the author, can be prepared with mixtures of linseed oil and various amounts of mineral or resin oils for making a quantitative determination of foreign oils in vegetable oils. He also points out that soy-bean oil is an excellent substitute for linseed oil in core making for the iron founding industry, and furthermore that it is better than cotton-seed oil.

The fluorescent test for mineral and rosin oils, P. H. WALKER and E. W. BOUGHTON (*U. S. Dept. Agr., Bur. Chem. Circ. 84, pp. 2*).—The Outerbridge method noted above was tested with pure linseed oil, other fatty oils of known purity, turpentines, and various mixtures with mineral oils.

It was found that many samples of vegetable oils of undoubted purity showed marked fluorescence, in some cases as marked as that of many pure mineral oils. "It appears, therefore, that while it is interesting to know that the inclosed arc is a very convenient means of strongly magnifying fluorescence, this fluorescence is not proof of the presence of mineral or rosin oil."

The uviol light was also tried as a source of illumination but found to be in no way equal to the inclosed arc.

Cotton wax, E. KNECHT and J. ALLAN (*Jour. Soc. Dyers and Colourists, 27 (1911), No. 6, pp. 142–146; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 13, p. 813*).—Raw cotton when extracted first with light petroleum ether and then with benzol yields 2 fractions of the wax, the first of which is dull yellow in color, odorless, and resembles beeswax as regards texture and fracture. The physical and chemical constants of the first fraction are described in detail.

Report on method of determination of glycerol, E. PROBECK (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, pp. 253, 254*).—The acetin method, according to this author, always yields results which are from 0.2 to 0.5 per cent low, no matter how careful the procedure is carried out. This is not due to impurities present in the mixture but to errors introduced during the process of manipulation.

The author prefers the bichromate method when acrolein and other volatile aldehydes are absent. When aldehydes are present these are removed before adding the bichromate solution. The use of a blank test simplifies the method considerably, and yields more accurate results than a method which necessitates the purification of the glycerin.

Hippuric acid as the cause of the failure of the spectroscopic test for hemoglobin in urine, F. A. MCDERMOTT (*Jour. Amer. Chem. Soc., 33 (1911), No. 6, pp. 992–995*).—Hippuric acid was found to decompose hemoglobin and thus prevent the appearance of the characteristic absorption band of this pigment in the spectroscope. This can be prevented by previously neutralizing the hippuric acid with ammonia.

Modification of the phenylhydrazin reaction, J. Böeseken (*Chem. Weekbl., 7 (1910), No. 43, p. 934; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 578, II, p. 1118*).—The author substitutes for phenylhydrazin a solution of the base in sulphurous acid, which will dissolve up to 10 per cent. The solution is prepared by passing washed sulphurous-acid gas through a mixture of phenylhydrazin and a sufficient quantity of water until all is dissolved. At the outset a crystalline precipitate separates, but this on further passage of the gas is dissolved. The solution contains compounds of the formulas $C_6H_5N_2H_3$, SO_2 and $(C_6H_5N_2H_3)_2$, SO_2.

"The reagent reacts at once with soluble aldehydes and ketones, and, on warming, with insoluble carbonyl compounds, the hydrazones being obtained in the pure state. Its efficacy has been tested with formaldehyde, acetaldehyde, acetone, benzaldehyde, *m*-nitrobenzaldehyde, acetophenone, cuminaldehyde, furfuraldehyde, *p*-chloroacetophenon, levulic acid, acetylacetone, acetonylacetone, and ethyl acetoacetate. When warmed with monoses at 80°, the reagent yields pure osazones. It has been tested with dextrose, levulose, *d*-galactose, *d*-mannose, *l*-xylose, and rhamnose."

A rapid volumetric method of sugar estimation, W. F. Sutherst (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, p. 256*).—The author, finding that a large amount of time is consumed in determining the end point of reduction with Fehling's method, modified the procedure as follows:

"Fifty cc. of normal Fehling solution was heated to boiling in a porcelain casserole, and the trial sugar solution run in from a small burette or graduated pipette, till a faint blue color is apparent at the edge of the vessel. From this to the finish as further sugar is run in, a drop of the mixture is placed on the top side of a filter folded in half; the filtrate passes through, free from copper oxid, to the under side and the spot moistened with a drop of a solution containing 10 gm. glacial acetic acid, 1 gm. potassium ferrocyanid in 100 cc. water. On holding up to the light the faintest trace of copper ferrocyanid can be perceived, and the end of the reaction plainly indicated at the first trial."

The quantitative determination of starch sirup according to Juckenack and Pasternack's method, L. Grünhut (*Ztschr. Analyt. Chem., 49 (1910), No. 12, pp. 745–758; abs. in Chem. Ztg., 34 (1910), No. 152, Repert., p. 630*).—With the Juckenack and Pasternack method starch sirup can be determined with certainty in most fruit juices and other fruit products, where the quantity is over 2 per cent. For a few of these products, however, the limit is 5 per cent. Only the examination of plum jam is uncertain.

See also a note by Beythien and Simmich (E. S. R., 24, p. 308).

The chemistry of raw sugar production, C. A. Browne (*Reprint from School Mines Quart., 32 (1911), No. 3, pp. 217–234*).—A detailed discussion in regard to the part played by chemistry in the raw sugar industry.

Relation between the potash and sugar content of sugar cane, H. C. Prinsen Geerligs (*Meded. Proefstat. Java-Suikerindus., 1910, No. 34, pp. 309–318; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 1, pp. 41, 42*).—An attempt was made to determine whether a relationship existed between the sucrose, Brix, purity, and potash values of a number of Javan juices. It was shown, however, that although it appears that a high potash content almost always points to a low sucrose content and a low purity figure, many instances occur in which there is no such relation. It is concluded that other important factors are present which exert more influence than potash.

The occurrence of raffinose in raw sugars and its determination, F. Strohmer (*Ztschr. Ver. Deut. Zuckerindus., n. scr., 47 (1910), No. 2, II, pp. 911–931; abs. in Ztschr. Angew. Chem., 24 (1911), No. 16, p. 762*).—While raffinose is not

present generally in the beet, it may exist under certain conditions of growth which have not yet been worked out. It is usually present to a noticeable extent only in the last products of sugar manufacture. Raw sugars obtained from normally worked up beets contain no raffinose.

The present methods of determining raffinose, according to the author, are not absolutely reliable for raw sugar, but where a mixture of pure saccharose and raffinose is under examination Herzfeld's inversion method yields accurate results.

In regard to the occurrence of raffinose in raw sugars, H. PELLET (*Österr. Ungar. Ztschr. Zückerindus. u. Landw., 39 (1910), No. 6, pp. 942–948; abs. in Ztschr. Angew. Chem., 24 (1911), No. 16, p. 762*).—The author agrees with the interpretation of Strohmer (see above), but considers the Herzfeld method thoroughly reliable for determining raffinose in raw sugars.

About some characteristics and the determination of raffinose, A. HERZFELD (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 659, II, pp. 1204–1211*).—A short description of the characteristics of raffinose, and a discussion in regard to the methods and the relation which raffinose has to molasses formation.

Raffinose or torrefaction products, A. VERMEHREN (*Deut. Zuckerindus., 36 (1911), No. 31, pp. 590, 591*).—As a result of his work the author concludes that it is not possible by existing methods to determine whether or not raffinose is present in molasses unless it is identified qualitatively. The difference noted between the direct and inversion polarization is probably due to torrefaction products. The raffinose formula gives questionable figures.

A guanin pentosid from molasses residue, K. ANDRLÍK (*Ztschr. Zuckerindus. Böhmen, 35 (1911), No. 8, pp. 437–443*).—A guanin pentosid was isolated which, according to the author, is a new and not hitherto noted constituent of molasses and molasses residue. It contains a large proportion of nitrogen.

The nitrogenous constituents of the beet and their cycle in the process of manufacturing raw sugar, J. E. DUSCHSKY, J. R. MINZ and W. P. PAWLENKO (*Ztschr. Ver. Deut. Zuckerindus., 1911, No. 660, II, pp. 1–25; abs. in Ztschr. Angew. Chem., 24 (1911), No. 16, pp. 760, 761*).—The content of total nitrogen in the beet was found to vary between 0.17 and 0.25 parts per 100 parts of beets, or between 1 and 1.2 parts per 100 parts of sugar in the beet. About one-half of the total nitrogen was found to be protein nitrogen, and it was noted that where the total nitrogen in the beet became higher the protein nitrogen became lower.

The injurious nitrogen was found to constitute about one-third to one-half of the total nitrogen contained in the beet. Between the sugar content and the content of some groups of nitrogenous bodies no relation could be established. In the diffusion process four-fifths of the protein nitrogen remains behind, while the proteins going over in the juice, according to the authors, are probably all removed or decomposed by the defecation and saturation process. The amount going over in the saturation juice is exceedingly small. The injurious nitrogen was found to pass over almost completely in the diffusion juice and from this into the saturation juice, whereby in many instances the amount of injurious nitrogen became greater than that originally present in the diffusion juice.

In regard to the indeterminable losses which occur in beet sugar manufacture, H. PELLET (*Ztschr. Ver. Deut. Zuckerindus., 1911, II, No. 664, pp. 435–443*).—It was found that an excess of lead subacetate acts in different ways upon the various components in beet juices which are usually grouped as optically active nonsugars. Glutamin and glutaminic acid, which rotate plus in an aqueous solution, will rotate to the left in a solution containing an excess of lead subacetate (10 per cent). Asparagin is rotated to the right. In a

10 per cent hydrochloric acid solution all of the above substances rotate to the right. If juices containing much lead subacetate are polarized a reduction corresponding to from 0.2 to 0.4 parts of sugar to 100 cc. of juice may be found.

Solutions of the sodium and potassium salts of asparaginic and glutaminic acid were examined by the author, with the result that the asparaginates showed a plus polarization in 10 per cent lead subacetate and 10 per cent hydrochloric-acid solutions, and the glutaminates a minus polarization in the lead subacetate solution and a plus polarization in the hydrochloric-acid solution.

Practically no change could be noted in the rotation of raffinose in the presence of alkalis, while invert sugar on the other hand was destroyed by them. According to this, raffinose has no influence upon the polarization of the saturation juices. Hydrochloric acid, therefore, seems to be the best medium for polarization.

In regard to determining the marrow content of beets, K. E. Skärblom (*Ztschr. Ver. Deut. Zuckerindus., n. ser., 47 (1910), No. 2, II, pp. 931–951; abs. in Ztschr. Angew. Chem., 24 (1911), No. 16, p. 761*).—Two methods for this purpose are described in detail.

A discussion of the cider vinegar standards, R. T. Mohan (*Pure Products, 6 (1910), No. 12, pp. 707–711*).—The author discusses the existing standards for cider vinegar, and concludes "that the only solution of the problem is the revision of standards based on actual manufacturing conditions which must be known from the time the apple leaves the tree until the vinegar is analyzed."

Innovations in the field of potato drying, H. Nehbel (*Fühling's Landw. Ztg., 59 (1910), No. 23, pp. 831–834*).—A discussion in regard to the newer processes and machinery.

On the preservation of horticultural products and wild berries in cooperative drying factories, G. Lind and J. Gréen (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 3, pp. 192–217, figs. 6*).—This is a description of the processes and machinery for drying vegetable products and various kinds of woods berries as conducted on a large scale in cooperative factories. It is accompanied by plans for the buildings required, with estimates of their cost.

The use of vacuum apparatus in manufacturing fruit essences for the soft-drink industry, E. Walter (*Pure Products, 7 (1911), No. 6, pp. 321–328*).—In this article are discussed the use of vacuum apparatus in preparing essences from peels of tropical fruits such as lemons, oranges, mandarins, etc., from berry fruits, particularly raspberries and currants, and from cherries and apples.

Olives, F. F. Hasbrouck (*Pure Products, 7 (1911), No. 5, pp. 252–254*).—This article deals with the processes involved in the preservation of olives.

METEOROLOGY—WATER.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander, R. N. Hallowell and H. W. Angier (*Massachusetts Sta. Met. Buls. 273, 274, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during September and October, 1911, are given. The data are briefly discussed in general notes on the weather of each month.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 4 (1911), pt. 3, pp. 103–181, pls. 2, figs. 12*).—This number contains the following articles: Variations of Temperature at Summit and Base Stations in the Central Rocky Mountain Region (illus.), by A. J. Henry; Waves

of Pressure in the Atmosphere Recorded by an Interferometer Barograph (illus.), by A. C. Crehore and G. C. Squier; The Amount and Vertical Distribution of Water Vapor on Clear Days (illus.), by W. J. Humphreys; The Earth's Radiation Zones (illus.), by W. J. Humphreys; The Height and Temperature of the Isothermal Region at Different Latitudes and under Different Conditions, by W. J. Humphreys; Meteorological Photographs, by C. F. Talman; and Free Air Data, at Mount Weather, for April, May, and June, 1911 (illus.), by W. R. Blair.

The agricultural zones of the Tropics in their relation to climate, W. R. ECKARDT (*Tropenpflanzer, Beihefte, 12 (1911), No. 5, pp. 399–508*).—This article is intended as an introduction to succeeding articles to be based on the author's own studies and gives a detailed review of the literature of the subject, including the influence of climate on the soil, plant and animal life, and agriculture of the Tropics, and a climatic classification on the basis of vegetation, more particularly cultivated plants.

The rains of the Nile Basin and the Nile flood of 1909, J. I. CRAIG (*Survey Dept., Egypt, Paper 17, pp. 55+III, pls. 9*).—Observations similar to those of previous years (E. S. R., 23, p. 312) are recorded in this report.

The author is of the opinion, as a result of his studies, that within a few years the prediction of the main features of the Nile flood "may be embodied in an algebraic formula such as has already been obtained for the Indian monsoon by Mr. G. T. Walker. . . . The rainfall in Abyssinia during the flood months is due almost entirely to the precipitation caused by diurnal ascensional movements acting on the southwesterly current which again is kept at the point of saturation by its ascent on to the Abyssinian tableland." The course of the latter has been pretty clearly traced across the African continent to the South Atlantic.

[Water analyses, 1910], R. E. ROSE (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 139–156*).—Partial and complete mineral analyses of a large number of samples of water from different parts of the State are reported.

The drying of sludge, F. SPILLNER (*Mitt. K. Prüfungsanst. Wasserver. u. Abwässer. Berlin, 1911, No. 14, pp. 27–84, figs. 8; abs. in Engin. and Contract., 36 (1911), No. 12, pp. 303–307; Wasser u. Abwasser, 4 (1911), No. 9, pp. 382, 383*).—It is pointed out that the most important problem in connection with sludge disposal is the removal of the excess of water. Various processes which have been proposed for this purpose are described. Analyses are given of wet and dry sludge prepared by the so-called Emscherbrunnen process. According to these analyses the water in this sludge varied from 75 to 80 per cent, the dry sludge containing from 1.1 to 1.56 per cent of nitrogen.

It was found in experiments with sludge prepared by different processes that septic tank sludge which had undergone considerable decomposition furnished a product which was most easily dried and put in condition for subsequent handling as a fertilizer, fuel, etc.

SOILS—FERTILIZERS.

Soil surveys for agricultural purposes, A. D. HALL and E. J. RUSSELL (*Rpt. Brit. Assoc. Adv. Sci., 1910, p. 585*).—It is stated that "the object of a soil survey is to give an account of the soils of an area in their relation to the local agriculture. The methods adopted must be such that it is possible (1) to classify together soils of the same formation which have similar agricultural properties, and differentiate between others with dissimilar properties; (2) to bring out clearly and unmistakably any connection that may exist between type of soil and special crops or special agricultural methods; (3) to afford

guidance as to crops that may succeed, or are not likely to do so; (4) to throw light on the manurial requirements of the soils."

The authors are of the opinion as a result of their experience in such work that the geological formation affords the best basis for a soil survey, although admitting that considerable difficulty is encountered where the formation is obscured by drift.

Mechanical analysis is considered the most important of the various determinations made in the course of soil analysis, and it is believed that "for agricultural purposes the size of the soil particles is more significant than their actual composition." This is emphasized by the controlling influence of the size of particle upon available water supply and tillage.

Of the chemical determinations the total carbonate is considered as perhaps most important. "The amount and nature of the organic matter is important, and it is necessary to know whether free acid is present or not. Like calcium carbonate, humus modifies the properties of the finest particles."

Soil surveys and soil analyses, A. D. HALL and E. J. RUSSELL (*Jour. Agr. Sci., 4 (1911), No. 2, pp. 182–223*).—This article is based upon a survey of the soils of southeast England (E. S. R., 25, p. 818), and discusses the value, methods, and purposes of a soil survey, giving particular attention to the relative value of mechanical and chemical analysis (see also above) as illustrated by typical examples of the soils of this particular area.

"Since our present conventional methods of chemical analysis fail to characterize the soil with sufficient completeness we recommend that for purposes of a survey a large number of soils should be submitted to mechanical analysis, including the determination of organic matter and of calcium carbonate, and then a carefully chosen representative set, not necessarily more than a half or even a quarter, should be analyzed chemically.

"Up to a certain point . . . the mechanical analysis should form the basis of the survey because it alone takes account of those physical functions—the regulation of the water supply and therefore of the temperature, of the air supply, ease of cultivation, etc.—that play so large a part in determining the value of a soil.

"But on the other hand mechanical analysis is restricted in its application and gives useful indications with one only of the well-defined chemical types into which soils may be divided. In one area four chemical groups are recognizable: (1) Chalk soils, (2) acid humus or peat soils, (3) neutral humus soils, (4) mineral soils, i. e., sands, loams, and clays. It is to this last group alone that mechanical analysis can be applied with any degree of usefulness, but since agricultural soils belong so largely to this group the method is really applicable in by far the great majority of cases."

The interpretation of the results of both mechanical and chemical analysis are discussed at some length.

Soils of the Eastern United States and their use, XIX–XXIII, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circs. 41, pp. 16; 42, pp. 14; 44, pp. 19; 45, pp. 14; 46, pp. 20*).—These circulars deal respectively with the following soil types, as surveyed and mapped by the Bureau of Soils:

Circular 41, The Wabash Clay, of which a total area of 419,915 acres in 23 areas in 9 States has been surveyed and mapped.

Circular 42. The Trinity Clay, of which a total of 570,434 acres in 20 surveys in 3 States has been surveyed and mapped. "The Trinity clay is a black, tenacious, heavy clay found in the alluvial bottom lands of the main streams which flow through the black Cretaceous prairies of Alabama, Mississippi, and Texas and to a considerable distance along the lower courses of such streams as have their headwaters in the prairie sections. . . . The greater proportion of the

Trinity clay is subject to annual overflow, and for this reason the type is not extensively used for the production of farm crops. Drainage is also poor over the greater part of the type."

The author states that probably 350,000 acres of this soil type might profitably be reclaimed by embankment and drainage.

Circular 44, The Norfolk Sand, of which a total of 2,542,412 acres in 55 areas in 12 different States has been surveyed and mapped. The Norfolk sand is an extensive type of soil occurring along the Atlantic and Gulf coasts from New Jersey to Texas, and "is characterized by a gray or pale-yellow surface sandy soil having a depth of 6 to 8 in. in the majority of cases. This is underlain by a yellow, or slightly reddish-yellow, or, occasionally, orange, sand subsoil, which extends to a depth of 3 ft. or more. . . . It is well drained, free from swamps and, in the majority of instances, the character of the soil and the gentle slopes within its area prevent any serious erosion of the type." Its best use is for the production of extra early market-garden and trucking crops for which it is excellently adapted. Of the staple crops corn and cotton are most universally grown where climatic conditions are favorable.

Circular 45, The Norfolk Sandy Loam, of which an area of 2,000,850 acres in 40 different areas located in 10 States has been surveyed and mapped. "The Norfolk sandy loam is an extensive soil type developed within the lower lying portions of the Atlantic and eastern Gulf Coastal Plains. It lies at varying altitudes from sea level up to 150 or 200 ft. above tide, but the greater part of the type is probably found between altitudes of 50 and 150 ft. . . . The Norfolk sandy loam may be characterized as a fair general farming soil in all of the areas where it occurs, and is particularly well suited to the production of medium upland cotton in the more southern States. It is also a type which may be utilized for the production of the main truck crops of mid-season maturity."

Circular 46, The Orangeburg Fine Sandy Loam, of which a total of 2,507,840 acres in 50 different surveys located in 10 States has been surveyed and mapped. "The Orangeburg fine sandy loam is one of the most extensively developed of the Coastal Plain soils. It is found chiefly in the Gulf Coast region, although scattered areas exist in the Middle Atlantic States. . . . Erosion is the greatest menace, and all of the steeper slopes should be carefully tended to prevent an almost imperceptible wash of the finer grained material to lower levels." The soil is stated to be particularly adapted to upland cotton and the Cuban cigar-filler tobacco. "It is the best Coastal Plain soil for the production of peaches, particularly the Elberta," and a fair average corn and oat soil.

The selection of land for general farming in the Gulf coast region east of the Mississippi River, W. E. THARP (*U. S. Dept. Agr., Bur. Soils Circ. 43, pp. 11*).—This circular is intended to give information to immigrants on the local variations in soil types, drainage, clearing new land, organic matter content, and the use of fertilizers for general farming purposes in the region referred to.

The drift soils of Norfolk, L. F. NEWMAN (*Rpt. Brit. Assoc. Adv. Sci., 1910, p. 586*).—The drift soils are stated to cover almost completely the central and eastern parts of Norfolk and are classified by the Geological Survey Department as boulder clay, sands and gravel, and loam and brick earth. "The soils of each, especially the boulder clay, vary very much in character and are extremely complicated, and small local differences occur even in soils resulting from the same type of drift. The sand and gravel soils are very apt to be cemented together by iron, forming a solid sheet of rock out of reach of the plow. This holds the water up, and peaty patches may occur completely alter-

ing the agricultural character of the land. In soil derived from the solid chalk the lime is often completely dissolved, leaving the soil actually deficient in lime."

Nearly all the surface drifts are deficient in lime. A preliminary survey showed a decrease in percentage of finer particles in the loams and brick earths from east to west and this decrease was reflected in a gradual lowering of the farm rents.

On the petrographic and soil conditions of the red sandstone (buntersandstein) formation in Germany, E. BLANCK (*Jahresh. Ver. Vaterländ, Naturk. Württemb., 67 (1911), pp. 1–77; abs. in Zentbl. Agr. Chem., 40 (1911), No. 10, pp. 651–654*).—This is a continuation of a previous article the general scope of which has been noted (E. S. R., 24, p. 315).

The author distinguishes not only three well-defined strata—the lower, middle, and upper—in the red sandstone of Germany, but also lines of demarcation in the petrographic composition of these strata. On this basis he found that the lower stratum of the lower red sandstone formed clay soil whereas the upper stratum formed loamy sands. The clay soils are stiff and difficult to work and must be drained for farming purposes; the loamy sands are good agricultural soils except the rougher uplands which are forested.

The middle red sandstone is distinguished from the lower by the large boulders it contains. In it are distinguished three strata, the lower being mellow and containing boulders; the middle composed of firm, coarse-grained, and thick sandstones with strands of clay; and the upper which is part silicated and part boulder.

In the upper red sandstone there are distinguished the sands, clays, and carbonates. It is the typical upper new red sandstone, the so-called "röt," and forms two classes of soils, the field and meadow and the forest soils, the latter being confined to the more broken regions.

Relation of calcareous soils to pineapple chlorosis, P. L. GILE (*Porto Rico Sta. Bul. 11, pp. 45, pls. 2*).—The cause of failure of pineapples with the appearance of chlorosis on certain areas in Porto Rico was investigated by means of pot experiments and a chemical survey of the pineapple soils of the island.

The results show quite clearly that on certain areas the trouble is due to an excessive amount of carbonate of lime in the soil.

"For ordinary sandy soils about 2 per cent of calcium carbonate renders them unsuitable for pineapples; smaller amounts than this do not appear to be injurious.

"Soils composed principally of organic matter may contain about 40 per cent of calcium carbonate and still produce vigorous plants.

"Pineapple plantings on calcareous soils should be abandoned and the land planted to lime-loving crops.

"In curing the chlorosis, fertilizers were ineffective, but treatment of the leaves with solutions of iron salts or crystals of ferrous sulphate applied to the roots was effective and induced a normal growth. This treatment does not appear to be commercially feasible.

"The chlorosis is not caused by an organic disease, but is the result of a disturbance in the mineral nutrition of the plant induced by the calcareous character of the soil.

"It is neither the mere alkalinity of calcareous soils nor the large amount of assimilable lime that causes this disturbance, but the combined action of the two properties.

"The disturbance in the mineral nutrition of the plant, or the primary cause of the chlorosis, seems to be the lack of iron in the ash or the small amount of

iron in the presence of a large amount of lime. A mere high percentage of lime in the ash does not induce chlorosis.

"Chlorotic leaves are lower in nitrogen and oxidizing enzyms than green leaves, due, probably, to the degeneration induced by the lack of iron.

"Strong light increases the chlorosis by the more rapid destruction of the chlorophyll."

Effect of soluble salts on the absorption of phosphates by soils, H. E. PATTEN (*Jour. Phys. Chem., 15 (1911), No. 7, pp. 639–658, figs. 6; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 22, p. 1325*).—The author reports the results of experiments to determine the effect of various salts on the quantity of phosphate soluble in soils treated with calcium monophosphate (350 lbs. of superphosphate per acre). Quartz and two soil types, one a sandy soil and the other a fine clay, were used as the absorbing bodies. Reference is also made to previous bulletins from this Department on the absorption of soluble bodies from solution by soils, and the work of Van Bemmelen on this subject is briefly reviewed.

From the results of these studies the author concludes that apparently "a higher concentration of phosphate may be obtained when weak solutions of salts ordinarily used as soil amendments (potassium chlorid, potassium sulphate, potassium and sodium nitrate, or potassium carbonate) are passed through the soil than can be obtained by the use of distilled water alone.

"This effect is not simply a question of the 'solubility' of phosphate in water or in the solutions used for percolation, since the volume of water held in contact with the soil material is in all cases far greater than that required to dissolve the small amounts of phosphates and of other salts present. The effect is evidently due to a disturbance and rearrangement of the equilibrium which exists or tends to exist between the soluble material retained by the soil and the soil solution. This disturbance of equilibrium having been produced by these soil-amendment salts again tends to readjust itself, giving (very roughly) a steady value for the concentration of the leachings.

"The absolute values of phosphate concentration in the various percolates are not to be taken as representing what would be obtained under field condition with these soils. The values are good only in the particular experimental environment and in comparison with each other; and even then are likely to be misinterpreted if one neglects the percolation rate and the irregularity of soil-percolation conditions. The effects of the liberated phosphates and of the added soil-amendment salt upon the physical structure and condition of the soil must likewise be considered. These effects are generally of considerable magnitude, and frequently so complicated that it is impracticable to predict their direction a priori."

The soil solution, F. K. CAMERON (*Easton, Pa., and London, 1911, pp. V+136, figs. 3*).—The purpose of this book is to show the importance of study, to point out the line of attack upon the problems, to make available for students of agriculture a systematic outline of the work so far accomplished, and in the main to encourage the further acquisition of knowledge in soil chemistry.

The material brought together has been presented to the faculties and students of several agricultural colleges in the form of a short course of lectures and has already been published (E. S. R., 23, p. 714). The different chapters treat of the soil, soil management or control, soil analysis and the historical methods of soil investigation, the plant-food theory of fertilizers, the dynamic nature of soil phenomena, the film water, the mineral constituents of the soil solution, absorption by soils, the relation of plant growth to concentration, the balance between supply and removal of mineral plant nutrients, the organic constituents of the soil solution, fertilizers, and alkali.

On the chemical nature of humus acids, A. RINDELL (*Internat. Mitt. Bodenk., 1 (1911), No. 1, pp. 67–80*).—The author reviews the work of other investigators on the subject, particularly that of Baumann and Gully (E. S. R., 23, p. 715), and reports the results of his own experiments showing that the action of added salts on sphagnum soils is a chemical one, this conclusion being based on the disparity between the absorbed cation and free acid. The theory that there are no sphagnum and humus acids and that the acid reaction is due to the colloid of the hyaline sphagnum cell coverings is not accepted by the author. He points out that moor soils having no trace of sphagnum contain humus acids.

[Address of the chairman of the subsection of agriculture], A. D. HALL (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 571–577*).—This is mainly a review of scientific investigations bearing on the fertility of the soil, which has previously been noted from another source (E. S. R., 23, p. 717).

The part played by micro-organisms other than bacteria in determining soil fertility, E. J. RUSSELL and H. B. HUTCHINSON (*Rpt. Brit. Assoc. Adv. Sci., 1910, p. 583*).—See a previous note (E. S. R., 24, p. 621).

The fixation of nitrogen by free living soil bacteria, W. B. BOTTOMLEY (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 581, 582*).—This article is based upon investigations which have been noted from another source (E. S. R., 24, p. 229).

Nitrogen fixation by yeasts and other fungi, C. B. LIPMAN (*Jour. Biol. Chem., 10 (1911), No. 3, pp. 169–182*).—The author reports investigations showing that "of eighteen organisms, including yeasts, pseudo yeasts, and molds, tested nearly all show a more or less pronounced power of fixing atmospheric nitrogen.

"Tap water sugar solutions are better suited for nitrogen fixation by the organisms tested than distilled water solutions. Mannite and lactose solutions are far superior to dextrose, saccharose, and maltose solutions for these organisms in distilled water, but dextrose is the best in tap water solutions. Maltose is the most unsatisfactory. The highest amount of nitrogen fixed was 2.94 mg. per gram of mannite by pseudo yeast Tulare No. 46b in distilled water mannite solution. The results of other investigators with reference to the nitrogen fixing powers of *Aspergillus niger* and *Penicillium glaucum* are confirmed. *Botrytis cinerea*, a parasitic fungus, has been found for the first time, so far as the writer is aware, to possess a nitrogen fixing power."

Six years' experiments with nitragin inoculation with special reference to green manuring, F. SCHINDLER (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 6, pp. 829–865; abs. in Ztschr. Angew. Chem., 24 (1911), No. 41, pp. 1976, 1977; Chem. Zentbl., 1911, II, No. 13, p. 980*).—The experiments here reported show that the benefit derived from inoculation depends upon the character of the plant and the conditions of culture under which the tests are made, but that in many cases, particularly on new lands and moor soils, it is a very profitable practice and will increase the benefit to be derived from green manuring. Serradella and lupines on new lands are especially benefited by inoculation. In certain cases where legumes were grown for the first time inoculation with soil extract containing the required organisms was more effective than the use of nitragin.

Different kinds of stable manure as sources of phosphoric acid, M. A. EGOROV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 4, pp. 498–528, figs. 5*).—In continuation of previous experiments (E. S. R., 24, p. 321), the author studied the changes which take place in the decomposition of manure with and without the addition of antiseptic substances, and reports results of sand cultures on chernozem and podzol soil comparing monopotassium phosphate, ferric phosphate, lecithin, phytin, nuclein acid, and different kinds of manure as sources of phosphoric acid.

It was found that in manure in which a moisture content of about 43 per cent was maintained, and which was kept in closed flasks at a temperature of 35 to 37° C. for 2 months and subjected to the action of a current of air, the loss of dry matter where toluol was added was 23.76 per cent, while where no antiseptic was added it was 45.2 per cent. The pentosans decomposed more rapidly than crude fiber, particularly in the absence of an antiseptic. When toluol was added and molds were absent the crude fiber was very slightly decomposed, but there was considerable decomposition of the pentosans. There was considerable loss of nitrogen in the presence of toluol. A reduction in the amount of phosphoric acid in the form of inorganic phosphates was noted, particularly in untreated manure, and a leaching out of the phosphoric acid of phytin in manure treated with toluol. The proportion of insoluble phosphoric acid largely increased in untreated manures.

This experiment was repeated with other samples of manure with similar results. In the pot experiments with oats a relation between the assimilability of the phosphoric acid of the organic fertilizer and the proportion of crude fiber and pentosans was observed. The conversion of easily soluble phosphoric acid into insoluble phosphoric acid during the decomposition of the manure apparently did not reduce the assimilability of phosphoric acid. Lecithin and phytin were apparently more effective as sources of phosphoric acid for oats on chernozem than on podzol soils, while manure was more effective on podzol soils.

The manufacture of chemical manures, J. Fritsch (*London, 1911, pp. XVI+339, figs. 69*).—This work originally appeared in French in 1909 (E. S. R., 22, p. 430). It is here translated into English by Donald Grant, who, from his "long experience as works manager and chemist in the sulphuric acid and chemical manure trade," has been able to add numerous original practical notes. The technical material has been drawn largely from German and (to a less extent in this edition) from English sources.

The subjects of the different chapters of the book are phosphoric acid; principal phosphate deposits; drying and enrichment of phosphates; historical review of superphosphate manufacture; theory of manufacture of soluble phosphates; manufacture of superphosphate; crushing, sifting, drying, and storing of superphosphate—retrogradation; compound manures; the manufacture of phosphoric acid, double superphosphates, and various products; the manufacture of phosphorus in the electric furnace; manufacture of bone dust and of bone superphosphate (vitriolized bones); manufacture of basic slag; nitrogenous manures; manufacture of manure from animal waste; recovery of nitrogen from distillery spent wash, and manufacture of cyanamid and of nitrate of lime; nitrogenized phosphatic manures; potassic manures; and transference and handling of raw materials and finished products.

The availability of nitrogenous materials as measured by ammonification, J. G. Lipman, P. E. Brown, and I. L. Owen (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 1–4, pp. 49–85*).—This article reports studies of the rate of ammonification as a means of studying the availability of dried blood, tankage, ground fish, cotton-seed meal, and various other substances of vegetable origin, such as corn meal, rice flour, wheat, rye, linseed meal, cowpea meal, and soy-bean meal. The method used was as follows:

"A large quantity of air-dry, silt loam soil was sifted and thoroughly mixed so as to furnish a uniform medium for bacterial growth. One hundred gram quantities of this soil were placed in tumblers, the nitrogenous material was added and carefully mixed with the soil, and the latter was then moistened with a quantity of water, or fresh soil infusion, sufficient to establish optimum moisture conditions. The tumblers were covered with Petri dish covers and

kept in the incubator at 27° C. for a definite period. Subsequently the different soil portions were transferred to copper flasks, about 200 cc. of water and magnesia were added, and the ammonia was distilled off and titrated against standard hydrochloric acid."

The influence of varying the amount of material used and the time of treatment was also tested, and the results of the ammonification tests were compared with results of pot experiments with the various materials. As a further check upon the results of the ammonification tests studies were made of the rates of nitrification. The results of the nitrification experiments agreed with those of the ammonification tests in indicating a sharp distinction between available and unavailable nitrogen, and "may be made to serve a useful purpose in the study of availabilities of nitrogenous fertilizers."

In further experiments it was found that the addition of inert substances, like peat, to the more available nitrogenous fertilizers, like dried blood, decreased the rate of ammonification to a certain extent, and it appeared that the dried blood was of but little help in stimulating the ammonification of the peat. It was found in general that mixing of nitrogenous materials depressed ammonification.

Applying the method to mixed fertilizers, it was found that "everything considered, the ammonification and vegetation tests show sufficient agreement to indicate that the former will be found useful in determining the availability of organic nitrogen compounds in mixed fertilizers."

Experiments with lime nitrogen, ammonium sulphate, and sodium nitrate in 1910, WEHNERT (*Landw. Wchnbl. Schles. Holst., 61 (1911), Nos. 38, pp. 743–748; 39, pp. 768, 769; 40, pp. 786–789*).—A continuation of previous cooperative experiments comparing these fertilizing materials under a variety of conditions of crop and soil is reported, the results in general showing a high efficiency for the lime nitrogen as compared with the other materials. Attention is, however, called to the difficulty in applying the very finely pulverized lime nitrogen.

Active phosphoric acid and pot experiments, G. S. FRAPS (*Trans. Texas Acad. Sci., 11 (1908–9), pp. 45–49*).—This is a short article based upon experiments which have been more fully reported elsewhere (E. S. R., 23, p. 423).

Phosphates, R. W. RICHARDS, G. R. MANSFIELD, H. S. GALE, and E. BLACKWELDER (*U. S. Geol. Survey Bul. 470–H, pp. 115, pls. 9, figs. 12; rev. in Amer. Fert., 35 (1911), No. 12, pp. 21–30, figs. 4*).—This publication contains preliminary reports on a portion of the Idaho phosphate reserve, rock phosphate near Melrose, Mont., and a reconnaissance of the phosphate deposits in western Wyoming, and is based upon examinations during 1910 in continuation of those of previous years reported in Bulletin 430–H (E. S. R., 24, p. 25).

The first report gives a description of the geography, origin and nature, and geology of the Idaho phosphate field, based upon the results of a detailed study of lands in Bear Lake and Bannock counties in southeastern Idaho, included in "the phosphate reserve created by the withdrawals of December, 1908, and December, 1909, by the Secretary of the Interior, which were ratified, confirmed, and continued by the President under the act of June 25, 1910, and also a reconnaissance examination of lands possibly phosphate-bearing outside of the reserve." It is estimated that the 9 townships examined in this area in 1910 are capable of yielding 1,158,970,000 long tons of high-grade (70 per cent) phosphate. The area previously examined was estimated to be capable of yielding 266,950,000 tons. Extending the same ratio of yield to the area which has been examined only in part by reconnaissance the total supply is estimated to be 2,500,000,000 tons of 70 per cent phosphate.

The occurrence of extensive beds of high-grade phosphate is indicated by the investigations made near Melrose, Mont. These beds are in a reserve of 33,950 acres withdrawn from public entry January 12, 1911, and are probably a continuation of the Idaho deposits.

The reconnaissance survey in western Wyoming indicated the occurrence of large and widely distributed deposits of phosphate, probably in continuation of those of Idaho.

Thomas meal, D. J. HISSINK and G. B. VAN KAMPEN (*Cultura, 23 (1911), No. 278, pp. 493–501*).—The authors found a sample of Thomas meal which contained only 8.9 per cent of phosphoric acid, of which 13.5 per cent was soluble in citric solution. A fluorin content of 0.3 per cent was found and inquiry revealed the fact that calcium fluorid was used in the process of manufacture of the steel products.

[Experiments with manganese sulphate on tobacco], F. MACH (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb., 1910, pp. 51–55*).—Manganese sulphate was applied to tobacco in combination with other fertilizing materials at rates of 0.6 and 1.2 gm. to 22 kg. of soil in pots and at rates of 45 and 90 gm. to plats 5.33 square meters in size. Contrary to the observations of various other investigators, no effect from the application of the manganese was observed in either the pot or plat experiments.

The composition of seaweed and its use as manure (*Bd. Agr. and Fisheries [London], Leaflet 254, pp. 8*).—This is a brief, popular compilation of information on this subject.

Utilization of kelp, T. H. NORTON (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 272, p. 899*).—It is stated that "the utilization of kelp as a source of iodin and potash salts continues to be a prominent industry on the shores of Norway." There are 9 establishments engaged in the industry. Besides supplying the home demand, these establishments exported, during 1910, 2,318 metric tons of kelp ash, valued at $64,000. "Less is done in Norway than in Scotland to extract in a commercial form potash salts from this ash, although all of the kelp works furnish potash fertilizers."

Analyses of Crotalaria (*Sta. Agron. Mauritius Bul. 25, 1911, pp. 72–75*).—Detailed analyses of ash constituents of *Crotalaria retusa* are reported. Water varied from 77.5 to 82.8 per cent, ash from 1.34 to 1.93, nitrogen from 0.32 to 0.44, phosphoric acid from 0.069 to 0.089, potash from 0.193 to 0.407, and lime from 0.386 to 0.530 per cent.

The fertilizing value of sisal waste, V. LOMMEL (*Pflanzer, 7 (1911), No. 9, pp. 531–534*).—Analyses of the dried juice and waste of sisal hemp plants gathered before blooming and during the blooming stage are reported as follows:

Fertilizing constituents in sisal waste.

Kind of material.	Moisture.	Ash.	Nitrogen.	Phosphoric acid.	Potash.	Lime.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Fresh plants in bloom	85.96					
Fresh plants before blooming	87.05					
Dry juice of plants in bloom	5.81	10.16	1.34	0.19	1.26	3.05
Dry juice of plants before blooming	6.21	15.41	1.37	.25	1.24	5.72
Dry waste of plants in bloom	14.37	9.17	1.15	.17	.48	4.77
Dry waste of plants before blooming	14.08	13.03	1.37	.24	.99	6.14

Notwithstanding the loss of nitrogen involved in burning the material, the author is of the opinion that incineration of the dry waste and application of the ashes to the soil is the simplest and cheapest method of utilizing it.

[Miscellaneous analyses, 1910], R. E. Rose (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 157–167*).—Analyses of miscellaneous samples of soils, muck, phosphates, marls, limestones, and other substances are reported.

Fertilizers, R. E. Rose and L. Heimburger (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 6, 7, 9–14, 22–34, 45–82*).—The results of fertilizer inspection in Florida, giving results of analyses during 1910, are here reported.

[Fertilizer inspection in Ohio], N. W. Lord and A. Vivian (*Off Bul. Ohio Dept. Agr., 2 (1911), No. 2, pp. 12–33*).—Analyses and valuations of fertilizers collected in the State during the spring of 1911 are reported, with notes on valuation of fertilizers and the use of fertilizers on different soils and crops. The text of the new fertilizer law, which becomes effective December 1, 1911, is given. The new law requires a more specific statement as to the character of the ingredients used in mixed fertilizers and closer agreement with guaranteed composition.

Analyses of commercial fertilizers, R. N. Brackett (*South Carolina Sta. Bul. 160, pp. 64*).—This bulletin gives results of analyses and valuations of 1,605 samples of commercial fertilizers inspected during the season of 1910–11.

Georgia's new fertilizer law (*Amer. Fert., 35 (1911), No. 9, p. 40*).—The text of the law approved August 22, 1911, is given. This law, which is in addition to those already in force, provides especially for a statement of the sources of the ingredients in the fertilizer, and award of damages to purchasers of fertilizers falling below their guarantied commercial value.

AGRICULTURAL BOTANY.

Investigations on the effect of etherization on plant metabolism, Jenny Hempel (*K. Danske Vidensk. Selsk. Skr., Naturvidensk. og Math. Afd., 7. ser., 6 (1911), No. 6, pp. 215–278, fig. 1*).—After giving a résumé of previous investigations on the effects of anesthetics on plants, the author describes her experiments with ripening seeds and seedlings of peas and lupines, maple buds, and potato tubers, ether being used in all cases as the anesthetic.

Small doses of ether accelerated the production of carbon dioxid in pea seedlings when exposed for a short time. Large doses retarded carbon dioxid production in proportion to the amount of ether used. During the after effect of ether narcosis the respiratory processes were always retarded. Sugar formation was accelerated in pea seedlings when exposed for a short time to small quantities of ether, but longer exposure and fairly large quantities of ether retarded it. Still larger amounts of ether increased the quantity of sugar present, due probably to the cessation of the transformation of sugars into polysaccharids. The inversion of sugars was checked by all treatments. The destruction of proteids accompanied by the formation of amids was accelerated by small quantities of ether, while larger doses retarded the destructive metabolism.

In ripening seeds small doses of ether accelerated the synthesis of proteids, while larger quantities retarded it. Very large amounts of ether not only arrested the increase in proteids but destroyed those already formed. A similar effect was observed for potato tubers. No injury was noticed in maple buds subjected to ether in small amounts. An increase in amids followed the exposure of treated buds to darkness. Large doses killed the buds.

As a résumé of the results, the author calls attention to the difference in the phases of the effect of ether-narcotization. First, there is an exciting phase which is produced by small doses used for exposures of short duration, and in which the normal processes of plant activity are accelerated. A second phase, narcosis proper, is produced by small doses for protracted periods, or

by enlarged doses for short duration, and is characterized by a retardation of the normal processes of plant activity. The third or toxic phase is where large doses or comparatively large doses are used for exposures of long duration, which produce all the phenomena characteristic of the death of the plants.

An extended bibliography is appended to the paper.

Delayed germination, L. H. Pammel and Charlotte M. King (*Contrib. Bot. Dept. Iowa State Col., 1911, No. 45, pp. 20–33, pl. 1*).—A résumé of earlier investigations of this subject is followed by a full account of the experiments upon which conclusions already noted (E. S. R., 24, p. 330) are based.

Dimorphic leaves of cotton and allied plants in relation to heredity, O. F. Cook (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 221, pp. 59, pls. 5, figs. 18*).—In continuation of a previous report (E. S. R., 24, p. 444), additional information is given regarding the dimorphic characters and variations of cotton and other plants, the author pointing out some of their relations to the problems of heredity and breeding. It is stated that recognition of dimorphism of the leaves and branches of cotton and other plants enlarges the range of characters that may be used in distinguishing varieties and in determining the influence of environment upon the expression of these characters. In general, there is a parallelism of variation in leaf characters extending through the many species and varieties of cotton, as well as the related genera of plants, and the modification of these dimorphic differences is said to represent one of the most serious disturbances of normal heredity induced by external conditions.

Honey plants of California, M. C. Richter (*California Sta. Bul. 217, pp. 973–1037, figs. 14*).—This bulletin presents an account of the flora of California which is visited by the honey bee for the purpose of gathering nectar, other sweetish material, pollen, and propolis. An account is given of each species of plants in which is presented a condensed statement giving the available information regarding the value of the plant to bee keepers. This information is based not only on the literature of the subject but also on the author's observations covering a considerable period.

The present bulletin is considered as a preliminary account, and it is the author's intention to continue the investigation.

Seeds and plants imported during the period from July 1 to September 30, 1910. Inventory No. 24 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 223, pp. 70*).—This bulletin gives a list of miscellaneous seeds and plants imported by the Office of Foreign Seed and Plant Introduction during the period mentioned above, the number of introductions being about 550.

Seeds and plants imported during the period from October 1 to December 31, 1910. Inventory No. 25 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 227, pp. 60*).—A list is given of the seeds and plants imported during the period mentioned above, most of the material having been collected by Mr. F. N. Meyer, agricultural explorer in Russian and Chinese Turkestan. About 450 numbers are given.

FIELD CROPS.

The importance of water in the life of cultivated plants, C. von Seelhorst (*Jour. Landw., 59 (1911), No. 3, pp. 259–291*).—This article summarizes the results of experiments on the importance of water in the growth of plants, conducted at Göttingen during the past 14 years by the author and others associated with him. The results of the various experiments have been previously published in 33 different articles, and the more important features of the work are here reviewed.

In general it was found that a high soil moisture content reduced the percentage of nitrogen and of protein and increased the percentage of ash in the

clover plant. The water requirements of rye were much less than those of wheat. Clover used the soil water most freely and left the soil in dry condition, while the potato, among the crops grown, used the smallest quantity of soil moisture and left the subsoil comparatively moist. Peas were found to be low in water requirement and oats high.

In the study of a number of varieties of wheat it was observed that the soil moisture content was capable of influencing the ripening period to such an extent that varietal characteristics in this regard were entirely lost. On soil containing 55 per cent of moisture there was little difference in the ripening period of 4 different varieties of spring wheat, but on soil with more moisture, and especially where a water content of 70 per cent was maintained, the differences in the period of maturity were quite marked.

Observations on the root development of crops grown alone or in mixtures, H. KASERER (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 8, pp. 1022–1030*).—A discussion is presented on the excretion of substances of an organic nature by the root systems of plants, and the results of observations on the development of the root systems of crops grown singly or in mixtures are reported.

Rape and turnips in all cases were of tap-root formation and gave little or no indication of being influenced in root development by other crops grown with them. A mixture of rye and barley showed considerable interweaving of the roots with a tendency to development near the surface of the soil. Peas and vetch grown together also were shallow rooted and the matting of the roots was light. The growth in a mixture of a gramineous and a leguminous crop always showed good matting of the root systems and this was especially true with barley and vetch and barley and peas. Here the matting was so perfect that no single plant could be separated from the mass without tearing the roots. Flax sown thickly and grown alone was inclined to form tap roots, but grown in mixtures the roots formed many laterals and when sown with barley, rye, peas, and vetch considerable matting took place, especially with vetch and rye. The most densely matted root systems were found where the 7 different crops entering into the experiment were grown in one mixture.

The conclusion is drawn that in pure culture of a crop the development of the roots of any individual plant is influenced by the growth of the roots of the individuals near it, and that this tends to bring about deeper root growth, while in the case of mixed culture, especially when the plants are not closely related to each other and in case sufficient moisture and plant food are available, each crop develops its root system as if it alone occupied the ground.

Fertilization of oil-producing crops, G. RAMNEK (*Ratsion. Udobr., 1910, No. 9; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 6, pp. 865, 866*).—Experiments were conducted in the Poltava government, Russia, with applications of 32 tons of barnyard manure per acre as compared with the use of 16 tons, the customary quantity used.

It was found that the heavier application increased the yield of poppy seeds by 40 per cent, the yield of summer rape seeds by 10 per cent, and the yield of straw of summer rape by 16.7 per cent. Doubling the amount of manure did not increase the yield of sunflowers materially. The heavy manuring increased in all cases the yield of hemp to a considerable extent, but the percentage of fiber in the crop was less than where only the ordinary amount of manure had been used.

As a rule, plowing to a depth of 9 in. gave much better results than plowing 5 in. deep. Flax, however, gave a better yield on the shallower plowed land. Flax gave a better yield when grown after clover than after rye.

Alpine pastures, G. SPAMPANI (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 63*).—This work is divided into 14 chapters. A discussion of the physiography of the principal Alpine and Apennine regions of Italy accompanies a statement of the areas of grass lands and pastures in various mountain regions of Italy. The chapters deal with tree planting in permanent pastures, temporary forage crops, mountain and dairy cattle industries, shelters and maintenance of mountain roads, upland irrigation, and with governmental methods of development of Alpine agriculture in Italy.

Experiments on the germ-ripening of grain, L. KIESSLING (*Landw. Jahrb. Bayern, 1 (1911), No. 6, pp. 449–514*).—The term germ-ripening is defined as the continuation of the ripening process after the grain is harvested and stored. The results of experiments by other investigators along this same line are reviewed and the author's own results and observations are reported.

Experiments with different strains of barley showed that the time required to complete the process of germ-ripening varied with the different strains and appeared to be a characteristic of the particular strain.

It was further found that in grain stored for several months in atmospheres of oxygen, nitrogen, and carbon dioxid, the germ-ripening was not arrested, although storing in shallow layers with direct access of air proved most favorable to the process. The presence of oxygen was most important. The action of carbon dioxid had no injurious effect upon the germination and but slightly prolonged the period of germ-ripening.

Injuring the grains by cutting or scratching through the seed coat increased the percentage of germination but it did not bring barley low in germinating ability up to the maximum germination.

The application of ether for 80 minutes increased the rapidity of germination, but when the barley was exposed to the ether vapors for a longer period the rapidity as well as the percentage of germination were perceptibly reduced, this being especially true of the barley in which the germ-ripening process was nearly complete. It appeared from the tests that each variety or strain of barley had its own individual reactions as a result of etherization and it is thought that varietal characteristics, the time the grain has been harvested, the season, and the history of the crop's growth may exert an influence in this connection.

The germination of barley, not as yet germ ripe, was favored by soaking in formalin, dilute sulphuric acid, and other solutions. The application of oxygen, especially at the beginning of the germinating process, it was found may also be of advantage in this regard, but it was noticed that in certain instances its action was a disadvantage, either when held by the water in which the grains were soaked or when acting upon the kernels in the form of gas. Drying the grain at a high temperature or aerating by means of vigorous motion at ordinary room temperatures also exerted a beneficial effect on the germination. Improvement in the germinating ability was secured in certain tests by the application of higher temperatures both with and without a reduction in the water content of the grain. These results led to the conclusion that germ-ripeness is not connected with changes in the water content of the seed grain, whether these are brought about naturally or artificially.

In tests made with soaking barley in water of different temperatures, it was found that of two varieties of barley, the one more nearly germ ripe required a temperature of 35° C. and the other a temperature of 40° for optimum results. The application of heat in its different forms was, as determined by the physiological condition of the kernels and the degree of germ-ripeness, either beneficial, neutral, or injurious to the germinating power. The effect on the germi-

nation of soaking barley lacking in germ-ripeness is influenced by the degree of germ-ripeness already attained. It was observed that in soaking samples for 2, 4, 6, and 8 hours, those more nearly germ-ripe were the first to be injuriously affected with reference to the rapidity and percentage of germination by the longer periods of soaking. For the samples in which the process of germ-ripening had not materially progressed, soaking gave a much more favorable result.

Experiments with oats indicated that the period required for germ-ripening is an individuality belonging not only to varieties but also to strains. It was noticed that varieties or strains with a short germ-ripening period were also the ones to sprout quickest upon sowing the following spring. Atterberg's observations that each degree of germ-ripeness requires a specific temperature for germination were confirmed in these experiments. In order to bring out the full percentage of germination under experimental conditions, the samples completely germ-ripe required a higher temperature than those in which the germ had not completely matured. Injuries to the seeds, and especially the removal of the hulls, were capable of increasing the rapidity as well as the percentage of germination. The action of oxygen on the oat kernels also caused them to germinate in a shorter time.

The results secured with wheat were similar to those obtained with barley and oats. Here it was observed that the more hardy varieties were also the first, as a rule, to complete the process of germ-ripening.

The experiments as a whole showed that the following substances and factors act as stimulants in the germination of barley, oats, and wheat: Acids, bases, limewater, calcium chlorid, formalin, naphthalin, manganese solution, light, galvanic currents, atmospheric electricity, injuries, ether, alcohol, chloroform, and other narcotics, different degrees of oxygen pressure during storing or germinating, higher temperature during storage with and without drying of the grain, and low temperatures during germination and storage.

Work with cereals at the Ploty station in 1909 (*Godichnyi Otchet Ploti. Selsk. Khoz. Opytn. Stantsii, 15 (1909), pp. 158–165*).—In the experiments described fallow broken in April yielded 1,634 kg. of winter wheat per hectare (about 1,454 lbs. per acre), that broken in May 1,604 kg., and that plowed in June 1,378 kg. In spite of unfavorable weather conditions early breaking gave better results than later breaking.

Three different depths of plowing, 9, 18, and 26 cm., were compared and in general the yield increased as the depth of plowing diminished. In the case of the fallow broken in April, however, the deepest plowing gave the best results.

In rotation tests with 3 leguminous crops the largest yield of winter wheat was secured after sainfoin, the next largest after alfalfa, and the smallest after clover.

A comparison of applications of barnyard manure and of superphosphate led to the conclusion that the so-called black soil, or chernozem, of Ploty is first of all lacking in phosphoric acid and that this substance is the active principle in barnyard manure when applied to this soil. In connection with these tests it was observed that all fertilizer applications were sufficiently effective in resisting the influence of drought to warrant their use.

Distribution of improved seed grain in Kansas, A. M. Ten Eyck (*Amer. Breeders Mag., 2 (1911), No. 2, pp. 125–132*).—This paper describes the methods practiced in securing and distributing improved seed grain in Kansas and summarizes the amount of work done along this line.

Alfalfa on Wildwood Farm and how to succeed with it, H. D. Folmer (*Columbus, Ohio, 1911, pp. 105, pls. 7*).—This book relates the experience in growing, harvesting, and using alfalfa on a farm in central Ohio.

The determination of the percentage of hull in barley, G. KÄMNITZ (*Trudy Bûro Prikl. Bot. (Bul. Angew. Bot.), 3 (1910), No. 5, pp. 183–208, figs. 2*).—This article describes and compares different methods in use for the determination of the percentage of hull in barley.

The hardness of the seed coat in clover, W. ROMANOWSKIJ-ROMANJKO (*Trudy Bûro Prikl. Bot. (Bul. Angew. Bot.), 4 (1911), No. 5, pp. 179–196, figs. 2*).—The significance of the hardness of the seed coat in clover is discussed and the results of observations made are reported.

It was found in general that the clover seed thrashed and stored in the ordinary way had a much higher percentage of germination than seeds retained in the heads several months after maturity. The author observed that the removal of the seed from the head causes softening of the seed coat, while its hardness is retained as long as the seed is in an unthrashed condition.

Winter emmer, M. A. CARLETON (*U. S. Dept. Agr., Farmers' Bul. 466, pp. 24, figs. 8*).—Discussions of the nomenclature, characteristics, distribution, cultivation, and uses of emmer accompany statements of the results of tests of its adaptation to conditions in the United States.

During the period 1905–1909 the average yield of winter emmer at McPherson, Kans., was 45.47 bu. per acre. During 1906–1908 the winter emmer G. I. No. 2337 produced an average yield of 32.54 bu. per acre at Amarillo, Tex., and during the 2 seasons 1907–1908 G. I. No. 2483 averaged 33.83 bu. per acre.

At Channing, Tex., G. I. No. 2337 averaged 39.1 bu. per acre during 1905 and 1906. Trials by farmers in various portions of the United States and the results of cooperative tests of black winter emmer in California are also reported.

At Worland, Wyo., 2 qt. of black winter emmer were sown in 1907. Only 72 plants survived in the spring of 1908 but among these were a few apparently of a different type with large coarse-growing straw and large composite heads of a dark color. These plants were used as the basis of an improved strain which has apparently not winterkilled at all since 1908. In 1908 four-fifths of an acre planted to this strain in rows 2½ ft. apart yielded 34 bu. of seed per acre. Sowr at the rate of from 30 to 34 lbs. per acre and left without further water for 26 days after the third irrigation it yielded at the rate of 69.1 bu. per acre.

Numerous tables present other data for the most part already noted from other sources.

Growing and using mangels, sugar mangels, and forage sugar beets with notes on their chemical composition, J. H. GRISDALE and F. T. SHUTT (*Canada Cent. Expt. Farm Bul. 67, pp. 20, pls. 5, figs. 7*).—Directions for producing and utilizing mangels, sugar mangels, and forage sugar beets are followed by tables presenting analyses of the dry matter and sugar in the juice of varieties grown in Canada during the period 1900–1909, and other data. During 1900–1909 Gate Post and Giant Yellow Globe mangels averaged 12.14 and 10.14 per cent dry matter respectively and 6.69 and 5.00 per cent sugar in juices.

Peanut culture in Kamerun (*Tropenpflanzer, 15 (1911), No. 9, pp. 503, 504*).—Together with a general discussion of peanut culture in Kamerun, the results of analyses of 26 different varieties of this crop are reported. The data given include moisture, fat, and protein content. In fat content the different varieties range from 8.5 to 65.74 per cent. All the varieties in question appear to be of African origin.

On the cultivation in Uruguay of Lolium temulentum ceptochœton, T. ALVAREZ (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., pp. 59, 60*).—An analysis of this variety of *Lolium temulentum*, made at the experiment station of Toledo, Uruguay, is presented. It is

stated that this rye grass has a forage value arising from productiveness, early ripening, and abundance of digestible carbohydrates.

Sulla (Hedysarum coronarium) (*Agr. Gaz. N. S. Wales, 22 (1911), No. 5, p. 454*).—A report of the results of tests of a special strain of sulla seed selected for many years. The seed was tested on 3 experiment farms.

Breeding experiments with tobacco, J. A. LODEWIJKS (*Ztschr. Induktive Abstam. u. Vererbungslehre, 5 (1911), No. 4–5, pp. 285–323*).—Statistical studies were made for 2 years of tobacco bred along pure lines.

The results indicated that the relation between the average value of the number, length, and width of leaves of different pure lines of this plant, under different conditions of growth, is constant provided these conditions of growth are the same for all lines at any one time. It is pointed out that these results represent illustrations of a law which may be deduced from Johannsen's discovery and Weber's law, which states that the relation between the average values of similar characters of different pure lines is constant under different conditions of growth if these conditions are the same for all lines concerned.

A note upon the method of applying fertilizers for the tobacco crop, G. N. BLACKSHAW (*Rhodesia Agr. Jour., 8 (1911), No. 6, pp. 901, 902*).—The government chemist reports good results from the use of a single-row fertilizer drill provided the fertilizer is dry and the lumps well broken down. "The tobacco plants set out on the land thus treated seemed to strike more quickly and grow more evenly than on that fertilized by hand, which is a decided advantage."

The manuring of tobacco on Mr. L. Black's farm, "Stapleford," Salisbury, G. N. BLACKSHAW (*Rhodesia Agr. Jour., 8 (1911), No. 6, pp. 894–900*).—Tables state in detail the data secured in experiments designed to determine the effect of supplying a single element, a complete fertilizer, a fertilizer deficient in one ingredient, and various proprietary fertilizers. Kraal manure was also tested.

The author urges care in accepting the conclusions as they are based on one season's work. It appeared that fertilizers containing only nitrogen or potash affected tobacco yield little if any but that superphosphate markedly increased the yield. The best returns and highest quality on the virgin soil used followed an application of a complete fertilizer with a high proportion of phosphoric acid.

A progress report upon soil and climatic factors influencing the composition of wheat, G. W. SHAW and E. H. WALTERS (*California Sta. Bul. 216, pp. 549–574, fig. 1*).—The author summarizes previous work along this line and gives numerous references to the literature of the subject, many of which have already been noted, in particular the work of Le Clerc and Leavitt (E. S. R., 22, p. 730).

The authors point out that a part at least of the earlier work on the composition of wheat was done in the presence of two variable factors, soil and climate. In the present work soil from Kansas was transported to California that the chemical composition of wheat grown on the two under uniform climatic conditions might be studied. On one end of each plat was grown a high gluten Turkey Red wheat previously grown on Kansas soil, while on the other end was planted a low protein California-grown durum wheat. The author describes the soils used, reports their mechanical and chemical analyses, and the analyses of the wheats grown. At harvest time the durum wheat gave a somewhat greater yield on the Kansas soil.

The tabulated results presented do not show that the soil produced any marked effect on the gluten content of the wheat. The low protein seed in 1907–8 produced a crop with about 4.5 per cent higher protein content than the seed used, indicating a marked seasonal change, but the difference in protein contents of the crops grown on the two soils was "entirely within the range of

analytical error." The high protein seed introduced from Kansas produced a crop lower than itself in protein content by about 2 per cent, but the difference between that grown on the two soils was only 0.27 per cent, in favor of the California soil. During the season 1908–9 the experiment was continued with very similar results.

Determinations of the alcohol-soluble nitrogen content indicate the same change between the original used and the resulting product, but as between the two plats the slight difference which occurred was generally in favor of the Kansas soil.

During 1908 a triangular soil exchange experiment was instituted in cooperation with this Department. California soil, Kansas soil obtained from the same place as that in the above experiments, and soil from the Arlington experimental farm of this Department were used. The seed used was also furnished by this Department. Tables state the chemical composition of the soils and seed used and of the crops obtained during the seasons 1908–9, 1909–10, and 1910–11. During each of these seasons the crops grown on the soil of the Arlington farm was pinched and the kernels were small, thus rendering the product incomparable with that grown on the other soils.

The author regards the results thus far obtained as throwing less light than would be desired upon "the primary question as to the influence of the soil nitrogen upon the nitrogen content of the wheat as could be desired." It appears that the soil nitrogen content has little if any direct influence on the nitrogen content of the crop, but that some climatic factor entirely overshadows the soil factor. "Further, it appears that the nitrogen content of an original seed when grown elsewhere than in a climate within which it has been acclimated, has little or no influence upon its progeny, and that even though it be acclimated still some seasonal climatic factor is sufficient either to lower the nitrogen content of a high-gluten wheat or raise the nitrogen content of a low-gluten original."

Wheat, G. Roberts and E. J. Kinney (*Kentucky Sta. Bul. 155, pp. 35–60*).—Among 42 varieties of wheat, many of which were tested each year except 1908 during the period 1905–1911, Jersey Fultz produced the highest 6-year average yield of 34.5 bu. per acre, and had an average weight per bushel of 60 lbs., and an average estimated milling quality of 93.7. Extra Early Oakley proved a good variety for strong land and Harvest King and B–383, a hybrid wheat furnished by this Department, also proved worthy of special mention. Among the bearded wheats Kansas Mortgage Lifter, Fulcaster, and Lancaster Red are especially recommended.

Well-screened plump Harvest King seed yielded 29.5 bu. per acre as compared with 26.3 bu. secured with the use of seed that had been slightly damaged in the shock and was not well screened. "Our experiments for 2 years on the rate of seeding seem to indicate that 6 pk. per acre produce the best results. However, not enough work has been done that much importance can be attached to the results."

Cultural directions are followed by suggestions for the treatment of diseases.

Wheat growing in Canada, the United States, and the Argentine, including comparisons with other areas, W. P. Rutter (*London, 1911, pp. X+315, pls. 2, figs. 31*).—The topics discussed in this work are the geographical distribution of wheat in America; the influence of soil, climate, and other factors affecting the yield and quality; classification of American wheats, and the division of American wheat fields on a climatic and soil basis; the cultivation, harvesting, storing, marketing, and transportation of the crop; yield and cost of production; price, acreage, production, and exportation; and the possibilities and probabilities of wheat in America.

The book contains a bibliography of several pages.

Tillage experiments with the plow, G. L. SUTTON, F. DITZELL, and H. J. KELLY (*Agr. Gaz. N. S. Wales, 22 (1911), Nos. 2, pp. 164–177; 3, pp. 254–259*).—The results of tillage experiments with disk, mold-board, and subsoil plows indicate that for deep plowing the disk plow is preferable to the mold-board plow. For breaking up land that is not to be fallowed or for plowing under a stand of weeds just prior to planting the mold-board plow is preferred. Tables present in detail the data obtained.

Thick and thin seeding trials, G. L. SUTTON ET AL. (*Agr. Gaz. N. S. Wales, 22 (1911), No. 7, pp. 598–609, figs. 2*).—These pages report the results of seeding wheat at various rates ranging from 20 to 60 lbs. per acre on 3 different experiment farms. The thicker sowings were generally followed by higher yields of hay and grain. Early plantings usually gave higher hay yields, but the mid-season plantings excelled in grain yield.

Behavior of Australian varieties of wheat when grown in England (*Agr. Gaz. N. S. Wales, 22 (1911), No. 5, pp. 382, 383*).—A field test of several varieties of Australian wheats under English conditions gave unsatisfactory results.

Wheat from Sunpan, China, C. FLAKSBERGER (*Trudy Bûro Prīkl. Bot. (Bul. Angew. Bot.), 4 (1911), No. 1, pp. 1–29, pl. 1, figs. 8*).—Botanical descriptions are given of 3 varieties of spring wheat and 5 of winter wheat. Samples of these varieties were collected in the Chinese province Sze-chuan. Their striking characteristic was the tenacity with which the ripe heads held the grain. Heads stored for 17 years still held the kernels well.

The milling and baking qualities of Indian wheats, A. HOWARD and GABRIELLE L. C. HOWARD (*Agr. Research Inst. Pusa [India] Bul. 22, pp. 32, pl. 1*).—The subjects considered are the milling and baking tests of 1910, the cultivation of wheat in the botanical area at Pusa, and the yielding power of the new Pusa wheats. Some data are also given regarding experiments now in progress.

According to the authors, the idea hitherto held that India can produce only weak wheats is erroneous, since strong milling wheats have been produced at Pusa during the last 3 years. The combination of high grain quality and high yield in the same wheat has been brought about by modern plant breeding methods. "The producing power of the soil at Pusa has been more than doubled by hot weather cultivation, by moisture conservation, and by embanking with occasional green manuring. Yields of over 40 bu. of wheat to the acre have been produced without manure, irrigation, or rain after sowing time. The methods adopted at Pusa can be applied with necessary modifications throughout the Indo-Gangetic plain. There is no doubt that a great increase in the yield of the present area of the alluvium under wheat and other crops is possible using only the means now possessed by the people."

Weed seeds in the grains found on the markets of the province of Tscheljabinsk, Orenburg government, Russia, A. MALZEW (*Trudy Bûro Prīkl. Bot. (Bul. Angew. Bot.), 4 (1911), No. 7, pp. 231–255*).—This article enumerates the different kinds of weed seeds found in samples of grain secured on the markets of the province mentioned. The more common weed seeds found were the following: In wheat, *Polygonum convolvulus* and *Agrostemma githago;* in oats, *P. convolvulus, A. githago, Avena fatua glabrata,* and *Neslea paniculata;* and in rye, *P. convolvulus, Chenopodium album, Echinospermum lapula,* and *N. paniculata.*

Field weeds of the Cherson government, J. PACZOSKI (*Trudy Bûro Prīkl. Bot. (Bul. Angew. Bot.), 4 (1911), No. 3, pp. 71–146, figs. 2*).—A list is given of the principal weeds occurring in the Cherson government, Russia, together with brief notes on their importance and distribution.

HORTICULTURE.

Electricity in relation to horticulture, J. H. PRIESTLEY (*Jour. Roy. Hort. Soc. [London], 37 (1911), No. 1, pp. 15–25*).—The author here describes the system of overhead electrical discharge and the use of electric light in the greenhouse, special attention being paid to questions that arise in regard to large scale experimental trials with these methods. The results obtained in experiments with the overhead discharge method have been previously noted (E. S. R., 23, p. 326).

The germination results secured with various vegetable seeds in a forcing experiment with a Cooper Hewitt mercury vapor lamp, conducted by Miss E. C. Dudgeon in 1910 are here given. Rapid germination and continued rapid growth resulted from the use of the lamp for a period of some 2 hours every evening after daylight had failed. There was no indication of overexertion of tissues, the plants having, if anything, a better appearance than the controls. In this experiment the ultra-violet rays appeared to have caused no injury to the plant.

Electricity in horticulture, G. F. S. ELLIOT (*Gard. Chron., 3. ser., 48 (1910), No. 1244, p. 314; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., pp. 38, 39*).—A small overhead installation was used by Miss E. C. Dudgeon at Dumfries, Scotland, in 1910. The discharge wires were placed about 15 ft. above ground and, except for a total period of about 3 weeks during unfavorable weather or repairs, the apparatus was used regularly after May 30 with crops of oats, potatoes, beets, peas, strawberries, and onions. In fine weather the apparatus was used only for about 2 hours at sunset. In cloudy weather the discharges were continued for 4 or 5 hours, and in showery weather as long as the wires were dry enough.

No control plats were used, but as compared with neighboring crops the results as a whole show more luxuriant growth and increased yield on the electrified plats. The experiments are to be continued with control plats.

Horticulture on moorlands.—A report on the utilization of our German moors in horticultural pursuits, T. ECHTERMEYER (*Ber. Landw. Reichsamte Innern [Germany], 1911, No. 22, pp. 36, pls. 30, map 1*).—In 1909 the author made a survey of agricultural conditions in the West German and Holland moors. The present report embraces the results of a horticultural nature, showing what has been accomplished in Holland on these soils as well as the possibilities of similar situations in Germany. In conclusion a number of recommendations are given dealing with the exploitation and development of German moorlands.

Frost protection in fruit orchards (*Sci. Amer. Sup., 72 (1911), No. 1869, pp. 281, 282, figs. 3*).—Methods proposed mainly by A. G. McAdie, of the Weather Bureau of this Department (E. S. R., 22, p. 217; 24, p. 38; 25, pp. 37, 420), are briefly described.

An analysis of western spraying methods, A. L. MELANDER (*Better Fruit, 6 (1911), No. 4, pp. 39–41*).—Considerable data were secured through correspondence during the seasons of 1909 and 1910 relative to methods of spraying for the codling moth in the State of Washington and, in a few cases, elsewhere. The data secured from over 60 growers as here summarized show how many applications of arsenate of lead were made, the number of gallons of spray made with each pound of arsenate of lead, the method of spraying, total crop in boxes, and the amount of loss.

The results for the two seasons show that a single application of spray at the end of blossoming averaged but 1 per cent of loss, 2 applications averaged 4.5 per cent, and with 4 or more sprayings during the season, 8 per cent of

the crop was lost. The author reports that C. P. Gillette has obtained similar results from statistics gathered in Colorado. The author concludes that freedom from wormy fruit is more dependent on a thorough application when the trees are in blossom than upon the number of sprays given. "The calyx cup must be filled, and this demands high pressure, the Bordeaux nozzle, crook, and tower."

Peach growing in Alabama, P. F. Williams and J. C. C. Price (*Alabama Col. Sta. Bul. 156, pp. 109–142, figs. 5, charts 6*).—A popular treatise discussing location, site, preparation of the land, selection of trees, planting operations, fertilizers, pruning, subsequent care of the orchard, insects and diseases and their control, thinning, harvesting, packing, marketing, by-products, and selection of varieties. Descriptive notes on varieties tested at the station follow, together with charts showing the date of opening of buds in 1911, including normal blooming and ripening dates at the station, and charts showing the maximum and minimum temperatures recorded at the station by the horticultural department for the years 1904 to 1911, inclusive, during the peach blooming period.

The geotropic angle of the roots in relation to the development of the leaf perimeter and the productiveness of grapes, R. Averna-Saccà (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 4 (1910), pp. 199–251, figs. 3*).—In a previous investigation (E. S. R., 22, p. 144) the author found from a study of various species and varieties of grapes grown under similar conditions that there is a correlation between yield, sugar content, and acidity and the amplitude of the angle formed by the median nerve and the exterior lateral nerve of the leaf, the greater the angle of amplitude the greater the yield of grapes and the sugar content of the must. He then sought to determine what relation, if any, existed between the geotropic, or initial, angle of the secondary roots and the development of the leaf perimeter. The results are tabulated and discussed.

The investigation as a whole shows that the amplitude angle of the secondary roots may vary from an acute angle to almost a right angle. The amplitude is constant for the same species, variety, or race but varies between different species, varieties, and races. It appears to coincide with the amplitude of the axillary angle of the vegetative shoots and also with that of the leaf perimeter. Under similar soil and cultural conditions, the yield and the must of a given species, variety, or race of grapes increase as to sugar content with the increase in the amplitude of the different angles.

Grape growing and grafting, Dümmler (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenberg, 1910, pp. 87–104*).—A progress report on the work of the grape nursery and the grafting experiments at the agricultural experiment station at Augustenberg, Grand Duchy of Baden. Tabular data are given showing the condition of various scions grafted on different stocks, together with observations on the different stocks used and on the older grafted vines.

On the duration of grafted vines and means of prolonging it, G. Couderc (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), Nos. 40, pp. 396–407; 41, pp. 426–435, fig. 1*).—A paper on this subject, in which the author presents a number of instances to show that the grafted vineyard in general has a limited and inferior duration to that of the old vineyards.

He concludes that all of the American vines are attacked by phylloxera and that they will all succumb to the attack when the cultural conditions are unfavorable. A number of these stocks, however, are sufficiently immune to make superior and durable vineyards under proper cultural treatment. To prolong the life of grafted vines, he advocates deep working of the soil and liberal nourishment of the plants every 3 or 4 years with heavy applications of stable manure, supplemented by commercial fertilizers. This enables the vines to

develop a vigorous supply of new roots and thus overcome the attacks of the phylloxera.

Another means of prolonging the line of the vines is by employing the "adjuvant" graft, or the use of 2 stocks for 1 scion. Experiments with companion stocks have shown that they have a greater period of duration than either of the stocks used alone. By using a series of "adjuvant" stocks, the author has been able to flower and fruit vine cuttings the first season. This is accomplished by grafting a stock having one internode and a good root system under each eye along the length of the cutting, which remains in a horizontal position.

The hybrid producers in 1910, PÉE LABY (*Jour. Soc. Cent. Agr. Haute-Garonne, 21 (1911), No. 218, pp. 27–52*).—This comprises a report for 1910 relative to the resistance of various direct bearing hybrid grapes to the mildews and insect attacks, as well as their adaptability to different soil conditions.

In spite of the intensity of the mildew in 1910, a number of the hybrids were found to be sufficiently resistant without any form of treatment. An important fact brought out was that a number of the hybrids which were supposed to possess strong power of resistance will not prove resistant during such seasons as 1910 unless given a certain number of treatment with sulphate of copper. Thus handled they were much more resistant than the French vines which were repeatedly sprayed.

The olives of Corfu, J. B. SORDINA (*Ann. École Nat. Agr. Montpellier, n. ser., 11 (1911), No. 2, pp. 108–147, pls. 4, map 1*).—This comprises a preliminary agrogeologic study of the olive industry on the island of Corfu, in which the author considers the growth of the olive in relation to the various geologic formations of the island.

The Satsuma orange, P. F. WILLIAMS (*Alabama Col. Sta. Bul. 157, pp. 143–174, figs. 8*).—A popular treatise dealing particularly with the culture and adaptability of the Satsuma orange to Baldwin and Mobile counties in Alabama. Information is given relative to existing plantings, description of fruit, the details of propagating, planting, growing and marketing, and diseases and insect pests.

Splits of the navel orange: Cause and remedy, J. E. COIT (*Cal. Cult., 37 (1911), No. 19, p. 449, figs. 10*).—From the author's observations so far made on the subject, he concludes that sudden variations in the weather act only as a contributory cause, the primary cause being imperfections in the skin and variations in its thickness. For the control of splits in old, established orchards the reduction of the variation in soil moisture to a minimum by skillful irrigation is advocated. It is believed, however, that by careful selection of bud wood the splitting tendency of oranges may be very largely eliminated.

Contribution to the study of the ripening processes of lemons, A. PARROZZANI (*Reprint from Ann. R. Staz. Agrum. e Frutticol. [Acireale], 1 (1911), pp. 36*).—The results of a preliminary biochemical study of lemons during the curing period are given. Fruit grown on sandy and on clay soils, harvested at the usual picking time in November and also at the time of complete maturity in February, was analyzed. The variations in weight, volume, and in composition of the different parts of the fruit are presented in tabular form.

There was an evident difference in the constitution of lemons grown on sandy soils and those grown on clay soils. The influence of potash and of lime on the general development of the fruit and on its acid content was especially noticeable. No definite conclusions are drawn from the present data as to the formation of the acid in the fruit, nor as to the influence of the chemical composition of the tissues of the endocarp on the resistance of fruit during transportation.

A bibliography of studies dealing with the ripening processes of fruits is appended.

Coconut palm culture, H. ZAEPERNICK (*Tropenpflanzer, Beihefte, 12 (1911), No. 6, pp. 509–611, pl. 1, figs. 22*).—A popular treatise on the culture and exploitation of the coconut palm (*Cocos nucifera*), the subject matter being based upon the author's experience of several years in Ceylon, Java, and Dutch New Guinea.

The kola trees and kola nuts, A. CHEVALIER and E. PERROT (*Vég. Utiles Afrique Trop. Franç., 1911, No. 6, pp. XXIV+483, pls. 35, figs. 33, maps 3*).—This monograph comprises historical, botanical, geographical, biological, chemical, pharmacological, and economic studies of the kola trees and kola nuts. With a view to making the work complete the authors have coordinated the results of their own extensive studies in Africa with the results of investigators on various phases of the subject. In the botanical section, which contains the greater amount of new information, the principal phases considered are the delimitation of the section Eucola, comprising the true kolas, a morphological, anatomical, and systematic study of the species, and a biological study of the kola trees. Particular attention is paid to the differentiation of the various species.

The study as a whole is intended as a reference work for specialists and as a general handbook of information for those interested in the culture and utilization of the kola nut.

A new tea plant, C. GRIMME (*Umschau, 15 (1911), No. 41, pp. 851, 852, fig. 1*).—A short descriptive account is given of *Catha edulis*, which occurs in large quantities in East Africa, particularly in Abyssinia. The leaves and young shoots of this plant have recently appeared on European markets as a substitute for tea.

Alpine flowers and rock gardens, W. P. WRIGHT (*London, [1911], 2. ed., pp. 292, pls. 55*).—The special feature of this work consists of an extensive series of color groups of alpines taken direct from nature.

Part 1 deals with the characteristics and habitat of alpine plants in nature and in British gardens; part 2, which is contributed by W. Graveson, comprises notes on alpine plants in their native habitat; part 3 deals with the formation of rockeries, planting, propagating, and culture of alpines; and part 4 contains special chapters on the most important rock plants, together with a brief description of the best alpine plants and selections for various purposes.

Rock gardens; how to make and maintain them, L. B. MEREDITH (*London, 1910, pp. XX+384, pls. 16, figs. 6*).—This comprises a practical guide for making and planting rock gardens, including estimates of cost.

Select carnations, picotees, and pinks: The history and cultivation of all sections, J. FRASER (*London, [1911], pp. IV+198, figs. 39*).—A popular treatise which aims to present a record of a number of the best varieties of carnations, picotees, and pinks, together with practical details of cultivation.

The sweet pea, C. A. JARDINE ([*London, 1911*], *pp. 48, dgms. 3*).—A popular treatise in which the author describes methods of growing sweet peas in favorable and unfavorable localities. Attention is also paid to the importance of the nitrogen-fixing bacteria in the successful culture of sweet peas.

Vines and how to grow them, W. C. MCCOLLOM (*Garden City and New York, 1911, pp. 314, pls. 31*).—This is a manual of outdoor and indoor climbing plants for flower, foliage, and fruit effects, both ornamental and useful, including shrubs and similar forms that may be used as vines. The general chapters deal with the uses and habits of vines, when and how to plant, soil and cultivation, supports and trellises, pruning and management, insects and diseases, and winterkilling and how to prevent it. In the succeeding chapters the various classes of vines are discussed relative to their specific adaptation and culture.

FORESTRY.

Trees and shrubs, edited by C. S. SARGENT (*Boston and New York, 1911, vol. 2, pt. 3, pp. 117–189, pls. 25*).—This is the seventh installment of a work which consists of a series of plates, accompanied by brief descriptions of new or little known trees and shrubs of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe and those of special economic interest. The work has been prepared with the assistance of a number of specialists and the material has been derived largely from the living collections and from the herbarium of the Arnold Arboretum.

Each part contains 25 plates and a volume consists of 4 parts. Part 1 of volume 1 was issued in 1902. The succeeding parts have appeared from time to time.

Trees and how to know them, W. A. LAMBETH (*Atlanta, Ga., Richmond, Va., and Dallas, Tex., 1911, pp. 52, figs. 48*).—A brief practical manual with analytical and dichotomous keys of the principal forest trees of the South.

Trees and forestry, MARY C. DICKERSON (*Amer. Mus. Nat. Hist. Guide Leaflet 32, 1910, pp. 104, pl. 1, figs. 77, dgm. 1*).—An elementary treatment of the subject based on the Jesup collection of North American woods in the American Museum of Natural History.

The distribution of woody plants in the Pike's Peak region, E. C. SCHNEIDER (*Colo. Col. Pub., Sci. Ser., 12 (1909), No. 6, pp. 137–169, map 1*).—The object of this paper is to present a picture of the associations of the woody plants that may be valuable to students of mountain distribution. One hundred and fifteen species are recorded. The associations of the woody plants are grouped into 12 different classes according to their habitat.

Studies on the soil improvement faculty of our important timber species, R. WALLENBÖCK (*Centbl. Gesam. Forstw., 37 (1911), No. 10, pp. 447–458*).—The author's soil investigations in mixed stands of oak and beech (E. S. R., 23, p. 146) were extended to include a number of stands of fir, spruce, pine, and larch.

As indicated by the water capacity of the soils in weight percentage, beech soils showed the best physical texture. The water capacity of soils in fir, spruce, oak, larch, and pine stands averaged 95, 95, 84, 81, and 79 per cent, respectively, of the water capacity of beech soils. The difference in water capacity between the soils of the shade-tolerant group, beech, fir, and spruce, and the light-demanding group, oak, larch, and pine, was from 3 to 4 times greater than the differences between the hardwood and coniferous species in each group.

The author concludes that the advantageous action of the hardwood foliage may be restricted largely to loam soils, whereas the sparser material of the coniferous trees, particularly the pine needles, is of most advantage on coarse-grained, sandy soils.

Recent developments from the experiments with foreign species of wood in Prussia, SCHWAPPACH (*Ztschr. Forst u. Jagdw., 43 (1911), Nos. 8, pp. 591–611; 10, pp. 757–782*).—This comprises the observations and results from cultural experiments with foreign timber species which were started in Prussia about 30 years ago. Consideration is given to about 45 different species. The statistics of the experimental areas are presented in tabular form.

The cubic content and form of the pine in Sweden, A. MAASS (*Skogsvårdsför. Tidskr., 1911, Fackafd., No. 6, pp. 209–257, figs. 2*).—Tables for computing timber in standing pine trees of different sizes are given on the basis of measurements of 1,869 trees made by the author in forests in different parts of Sweden.

A note on some statistical and other information regarding the teak forests of Burma, R. S. TROUP (*Indian Forest Rec., 3 (1911), No. 1, pp. II+73, pls. 8*).—The object of this paper is to present in convenient form information gleaned from working plan operations in the teak forests of Burma.

The successive chapters discuss the distribution of teak and the area of teak forests in Burma, the chief types of teak forest, statistics regarding the growing stock and yield of various teak forests, the rate of growth and exploitable age of teak, and the yield and outturn of teak forests in Burma. A map of Burma showing the teak forests under working plans in 1910 is appended.

Cultural experiments with the yew (Taxus baccata), A. BURCKHARDT (*Forstw. Centbl., n. ser., 33 (1911), No. 8–9, pp. 457–468*).—The author calls attention to the importance of the yew as a forest tree and reviews the literature on cultural experiments with this species.

Variability of plantation Para rubber, V. CAYLA (*Jour. Agr. Trop., 11 (1911), No. 123, pp. 266–270*).—The author calls attention to the great variability of cultivated Para rubber and points out the important causes of the variability which occur previous to and during coagulation and after coagulating the latex.

A new coagulant for Manihot glaziovii, A. ZIMMERMANN (*Pflanzer, 7 (1911), No. 9, pp. 499, 500*).—During the course of experiments conducted in Amani, the author found that the addition of a 1 per cent solution of calcium chlorid to the latex of the rubber tree *M. glaziovii* resulted in a fairly good coagulation. A 1½ per cent solution of calcium chlorid is considered sufficient to bring about complete coagulation at the end of the rainy period when the latex is especially fluid. The use of calcium chlorid reduces the cost of the coagulent considerably without injuring the elasticity and nerve of the rubber.

Barium chlorid, magnesium chlorid, and magnesium sulphate all proved to be rather strong coagulents but were not so active as calcium chlorid.

The forest resources, E. M. GRIFFITH (*Rpt. Conserv. Com. Wis., 1911, pp. 43–50*).—This comprises a concise statement of the forest resources of Wisconsin with recommendations bearing on their conservation.

Report of the forestry department for the year ended June 30, 1910, R. D. HAY (*Rpt. Forestry Dept. N. S. Wales, 1910, pp. 12, pls. 14*).—This is the usual report relative to forest areas and routine operations, including a financial statement for the year and data on imports and exports of timber. An outline is given of experiments in timber physics which are now under way. A paper dealing with reforestation in the Tropics with special reference to eucalypts is appended.

Photogrammetry and its importance for forestry, R. HUGERSHOFF (*Tharand. Forstl. Jahrb., 62 (1911), No. 1, pp. 123–132, figs. 8*).—The author points out and illustrates a number of ways in which photogrammetry may be applied in forestry.

Single seed selection, G. F. S. ELLIOT (*Jour. Roy. Hort. Soc. [London], 37 (1911), No. 1, pp. 1–8*).—The author cites evidence secured by different investigators to show that with various plants, and especially with trees, there is a distinct advantage in selecting the largest and finest seeds for stock.

A brief bibliography is appended.

On the influence of incorrect dimension determinations upon the content of logs, A. SCHIFFEL (*Centbl. Gesam. Forstw., 37 (1911), No. 8–9, pp. 371–390, figs. 4*).—The author describes practical methods for determining the errors in caliper measurements, shows the effect of these errors on the log content, and discusses the application and use of a several factor cubic formula as a means of diminishing the percentage of error.

Forest fires and their prevention, including forest fires in North Carolina during 1910, J. S. Holmes (*N. C. Geol. and Econ. Survey, Econ. Paper 22, 1911, pp. 43*).—This comprises comparative statistics of forest fires in North Carolina for 1909 and 1910, together with a discussion of the causes of forest fires and of preventive, protective, and educational measures. The statistics for 1910, which cover one-third of the townships of the State, show an estimated area of 580,000 acres of woodland burned over, with a consequent loss of over half a million dollars in timber and personal property.

Method of distinguishing powellized and the unpowellized wood, P. Singh (*Indian Forester, 37 (1911), No. 10, pp. 567, 568*).—The method described consists of a test for arsenic, a small quantity of which enters into the composition of the powellizing solution (E. S. R., 19, p. 848).

Wood pulp and its uses, C. F. Cross, E. J. Bevan, and R. W. Sindall (*London, 1911, pp. XI+270, figs. 37*).—This work, which comprises a general account of the evolution of the wood pulp industries, is based on both scientific and practical studies in the domain of cellulose. The successive chapters discuss the structural elements of wood, physical properties, chemical composition, wood pulps in relation to sources of supply, the manufacture of mechanical wood pulp, chemical wood pulp, news and printings, wood pulp boards, the utilization of wood waste, testing wood pulp for moisture, and wood pulp and the textile industries.

In order to bring out the position of wood pulps, in their various forms, as staple paper making raw material, a chapter is given which embodies specimen sheets of paper selected as types, with a description of their characteristics. A brief bibliography is appended.

DISEASES OF PLANTS.

Plant diseases (phytopathology), A. A. ÎAchevskiĭ (*Bolieznı rastenïĭ (fitopatologïa)*, *St. Petersburg, 1910, vol. 1, pp. 456, table 1, figs. 117*).—This book, which is printed in the Russian language, treats of the general influence of pathological factors on plants, the predisposition of plants to disease, the geographical distribution of fungi and means by which they are spread, remedies and methods for treatment, and directions for the collection and preparation of material for a study of plant diseases.

Investigations in plant diseases, H. C. Müller, K. Störmer, et al. (*Ber. Agr. Chem. Kontroll u. Vers. Stat. Pflanzenkrank. Prov. Sachsen, 1910, pp. 71–84, fig. 1*).—A report is given of miscellaneous investigations of plant diseases carried on during the year, including the diseases of grain, particularly means for preventing smut, and the diseases of beets, potatoes, and other vegetables.

Origin of heterœcism in the rusts, E. W. Olive (*Phytopathology, 1 (1911), No. 5, pp. 139–149*).—The author presents a contribution to the problem as to which of the two hosts is to be considered as the primary and which the secondary host of rusts. He believes that the plants which bear the gametophytic form of the rusts are the primary hosts of the hypothetical autoecious ancestors of rusts.

A preliminary report on the yearly origin and dissemination of Puccinia graminis, F. J. Pritchard (*Bot. Gaz., 52 (1911), No. 3, pp. 169–192, pl. 1*).—The results of a study of rust epidemics at the North Dakota Station are given.

The author found that *P. graminis* passed readily from wheat, *Agropyron tenerum*, *A. repens*, *Hordeum jubatum*, and *Elymus triticoides* to the barberry. His observations tended to oppose the theory that the æcidiospores and uredo-

spores of the rust are carried considerable distances by the wind. The uredo pustules of *P. graminis* were found on winter wheat as early as upon grasses near the barberry bushes, and with one exception were present upon spring wheat earlier than upon grasses remote from barberries.

The experiments seem to indicate that this rust does not spread to wheat fields from grasses and that there are three biological forms, one for wheat, one for barley, and one for rye, oats, and various grasses.

The uredospores of *P. graminis* failed to survive the winter of 1904–5 at Fargo, N. Dak. The author thinks the wintering of the rust as mycelium in plant tissues in North Dakota is very doubtful, but he has found the pericarp of rusted wheat grains frequently filled with rust mycelium and numerous pustules of teleutospores. The teleutospores on germination exhibited a palmella-like stage.

Attention is called to the possibility of infection of wheat by teleutospores occurring in the field, and the observations suggest the need of experiments along this line.

The wintering of Puccinia graminis tritici and the infection of wheat through the seed, F. J. Pritchard (*Phytopathology, 1 (1911), No. 5, pp. 150–154, pl. 1, figs. 2*).—In the present paper an account is given of some investigations which seem to confirm the conclusion in the above paper as to the occurrence of pustules containing teleutospores in wheat grains.

Wheat grains were selected which showed on microscopic examination infected areas about the hilum. These were planted and after the seedlings had attained a height of from 4 to 10 in. they were examined.

As a result of his investigations the author believes that at least one source of spring infection of wheat is plainly evident, for the fungus lives over winter in certain wheat grains and infects the plants. The mycelium from the pericarp penetrates various parts of the seedling, invading both the intercellular spaces and the cells. It soon passes into the spaces between the leaf sheaths, where it grows rapidly and attacks the tissues at various points. This fact is believed to explain the failure of Eriksson and Ward (E. S. R., 17, p. 873) to trace the fungus filaments beyond the first-appearing pustules.

An examination of samples of wheat in elevators in North Dakota showed infected seeds in all the samples, and in some the infected seeds were very abundant. It is thought that experiments with hot-water treatment of the seed are worth testing for the possible control of seed-borne infection.

The effect of the club root disease upon the ash constituents of the cabbage root, H. S. Reed (*Phytopathology, 1 (1911), No. 5, pp. 159–163*).—This is a more extended account of investigations noted elsewhere (E. S. R., 26, p. 54).

Irish blight, A. M. Lea (*Agr. Gaz. Tasmania, 19 (1911), No. 7, pp. 357–371, figs. 15*).—An account is given of the blight of potatoes due to *Phytophthora infestans*, which has appeared in a very destructive form in Tasmania. The author recommends spraying with Bordeaux mixture for its control, and outlines experiments which, although not yet fully completed, indicate a gain of about 50 per cent in favor of the sprayed plants.

Report of the pathologist, J. R. Johnston (*Porto Rico Prog., 1 (1911), Nos. 41, Sup., Rev. Azucarera, 1191, pt. 3, pp. 42–44; 43, Sup., Rev. Azucarera, 1911, pt. 4, pp. 25–31*).—Descriptions are given of various diseases found upon sugar cane in Porto Rico, with special mention of the root disease caused by *Marasmius sacchari*, this fungus apparently being widespread and causing much loss. In addition to brief descriptions of the diseases and suggested methods of control, the author outlines some investigations that are to be begun at once.

Scolytus rugulosus as an agent in the spread of bacterial blight in pear trees, D. H. JONES (*Phytopathology, 1 (1911), No. 5, pp. 155–158, pls. 2*).—In previous publications (E. S. R., 23, pp. 49, 352) attention was called to the probability of this beetle having an important part in the spread of bacterial blight in pear orchards. Subsequent studies have confirmed this conclusion, and the author found that practically every lesion on trunks and limbs of the trees under observation had within it a boring beetle. It appears to be conclusively proved that *S. rugulosus* is an active agent in the spread of bacterial blight among pear trees, and means should be taken to destroy this insect.

Peach leaf curl fungus, G. QUINN (*Jour. Dept. Agr. So. Aust., 15 (1911), No. 1, pp. 58–66, figs. 4*).—A report is given of investigations in spraying peach trees for the control of the peach leaf curl with Bordeaux mixture, Burgundy mixture, Bordeaux paste, and copper sulphate solution.

All of the treatments reduced the proportion of diseased leaves on the trees. Two applications of Burgundy mixture or of Bordeaux paste completely protected the trees, while a few diseased leaves were found where trees were sprayed with Bordeaux mixture or a single application of copper sulphate. In one experiment, however, with Bordeaux paste a large number of diseased leaves were found. Dressing the soil about the trees with iron sulphate did not give beneficial results.

The destruction of plum trees in the Rhine Provinces and the cherry tree disease, G. LÜSTNER (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1910, pp. 147–150*).—During 1910 heavy precipitation caused a repeated overflow of the Rhine River, and from June 20 to July 31 the adjacent country was submerged to a greater or less extent. This was followed in August by bright sunshine.

The leaves of plum trees were scorched and later died. Injury to maple trees from the same cause is noted, and attention is called to the fact that *Colchicum autumnale*, which generally flowers in the fall of the year, did not bloom until March, 1911, six months later than usual.

The disease of cherry trees in the same region is commented upon, and it is held to be due to unfavorable soil conditions. The author says that *Valsa leucostoma* is not the primary cause of the trouble, the fungus being able to attack only those trees that have been weakened from some other condition.

A bacterial gummosis of cherries, F. L. GRIFFIN (*Science, n. ser., 34 (1911), No. 879, pp. 615, 616*).—A description is given of a gummosis of cherry trees, for which the author believes that he has found a specific cause.

The disease is quite prevalent in Oregon upon cherry trees, and is thought to be due to *Pseudomonas cerasus* n. sp. Its characters are contrasted with those described for other bacterial diseases of cherries (E. S. R., 14, p. 458; 18, p. 947), but they are believed to be quite distinct. The author has isolated the organism, inoculated trees from pure cultures, produced typical symptoms, and reisolated the bacterium.

Cherry trees weakened through gummosis fall easy prey to various saprophytic fungi, *Schizophyllum commune* and species of Polyporus and Polystictus being the most common.

It has been found by experience that top working resistant stocks will to a great extent prevent the disease from appearing on the body or crotch of the tree, but this eliminates the gummosis factor only from the trunks and not from the fruit-bearing wood.

Experiments in the control of the red spot disease of grapes, G. LÜSTNER (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1910, pp. 175, 176*).—In continuation of previous notes (E. S. R., 24, p. 157), the author reports ex-

periments for the control of the disease of grapes due to *Pseudopeziza tracheiphila*.

On plats which received a heavy application of stable manure the disease made less progress than on the check plats. The effects of the application of manure were evident throughout the season and on all parts of the vine. The soil in the region reported upon is a very light sandy one, and the addition of manure increased the water holding capacity. This is thought to have made the plants more resistant to the attack of the fungus. Spraying with Bordeaux mixture had no effect in reducing the disease, although 4 or 5 applications of the fungicide were given the vines at suitable dates.

A variety of Cladosporium herbarum on Citrus aurantium in Florida, H. S. FAWCETT and O. F. BURGER (*Phytopathology, 1 (1911), No. 5, pp. 164–166*).—Upon investigating the scaly bark of citrus trees in Florida the authors found a fungus similar to but differing somewhat from *C. herbarum* as generally recognized.

Parallel cultures were made between the organism as found in Florida and pure cultures of *C. herbarum* received from Europe, and certain differences are noted which are considered important but not sufficient to warrant the description of a new species. On account of the differences the authors have described the form occurring in the scaly bark disease as *C. herbarum citricolum* n. var.

A more detailed description of the fungus and its relation to the disease is to appear in a bulletin of the Florida Station.

Report of mycologist for year ending March 31, 1911, II, J. B. RORER (*Bd. Agr. Trinidad and Tobago Circ. 4, 1011, pp. 70, pls. 13*).—This report deals chiefly with experiments in cacao spraying and the diseases of the coconut palm.

Preliminary experiments showed that Bordeaux mixture and lime-sulphur solutions strong enough to be active fungicides were slightly injurious to cacao flowers and very young tissues but in no way harmful to the young fruits. It was found that when trees were well sprayed twice the young fruit was protected from fungus attack, giving a net profit of from $20 to $40 per thousand trees. This profit, it is thought, should be greater in a few years, as the sprayed trees are free from moss and less liable to the canker infection. For the present it is recommended that trees be sprayed once just after the larger setting of the fruit and again a month or 6 weeks later.

The author, in discussing some other cacao troubles, states that the cacao witches' broom as it occurs in Surinam (E. S. R., 23, p. 455) is not found in Trinidad. In disposing of the empty cacao shells, composting them is recommended as the best method, and attention is called to the fact that spraying them with Bordeaux mixture is inefficient and expensive as generally applied.

The second portion of the report deals with diseases of the coconut palm, particular attention being given to the bud rot (E. S. R., 25, p. 552). The author claims to have isolated the causative bacterium, grown it in pure cultures, and produced successful inoculations both by wounding the tree and by pouring water containing cultures over the crown of the tree. The most successful means for the control of this disease seemed to be the cutting out and destroying those trees which showed the presence of the bud rot and thorough spraying with Bordeaux mixture.

A root disease is described the trees affected by which are said to resemble those attacked by the bud rot, but the author does not agree with others that the diseases are identical. He believes that the root disease is due to a physiological trouble resulting from unfavorable soil conditions.

Notes are given on a stem disease due to the fungus *Thielaviopsis paradoxa* and on leaf diseases caused by *Pestalozzia palmarum*.

Some brief notes are given on some sugar cane diseases, and the report concludes with a list of Trinidad fungi.

The control of the chestnut bark disease, H. METCALF and J. F. COLLINS (*U. S. Dept. Agr., Farmers' Bul. 467, pp. 24, figs. 4*).—This serious disease of the chestnut was first described in 1906 as occurring in the vicinity of New York City (E. S. R., 19, p. 250). Since that time it has spread, and is now known to occur in 10 States, and in the vicinity of New York City and adjacent counties it has practically destroyed all chestnut trees.

The cause and symptoms of the disease and means of spread and control are described at length, the method of control being largely based on a thorough inspection of forests and the destruction of all infected trees. This method was successfully put in application in the vicinity of Washington, D. C., in the fall of 1908, and up to June, 1911, the disease had not reappeared in the country within a radius of approximately 35 miles.

The text of the Pennsylvania state law of 1911 dealing with the disease is given in full.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The grouse in health and in disease, being the final report of the Committee of Inquiry on Grouse Disease (*London, 1911, vols. 1, pp. XXIII+512, pls. 59, figs. 33, charts 8; 2, pp. 150, pl. 1, maps 40*).—Volume 1 of this work is divided into 3 parts, the first (pp. 1–146) dealing with the normal grouse, the second (pp. 147–371) with the grouse in disease, and the third (pp. 372–502) with the management and economics of grouse moors. Volume 2 contains additional data dealing especially with young grouse and maps showing the incidence of grouse disease in former years.

Twenty-sixth report of the state entomologist, 1910, E. P. FELT (*N. Y. State Ed. Dept. Bul. 490, 1911, pp. 180, pls. 35, figs. 10*).—This report covers the year ended October 15, 1910.

The experimental work with the codling moth was continued during the year under more diverse conditions. Experiments were conducted in 3 orchards, the plats consisting of 42 trees and the fruits from the central 6 alone being counted. Comparisons were made to ascertain the relative efficacy of one spray given just after the blossoms dropped with this treatment supplemented by a second application about 3 weeks later. The author concludes from the data secured, which is here presented in detail, that it is possible with but one spraying to obtain over 90 per cent of sound fruit in a year when the codling moth is very abundant, even on trees yielding only from 300 to 500 apples. He is of the opinion that the possibilities of one thorough timely spraying have habitually been underrated. The conditions in the Hudson Valley are such as hardly to justify the repeated applications so generally in vogue in the western part of the State.

The juniper webworm (*Dichomeris marginellus*), a European species that does not appear to have been previously discovered in America, was received during the year from Tarrytown. Technical descriptions are given of its stages and a brief account of its life history and literature. Brief accounts and descriptions are also given of a large aphid spruce gall (*Chermes coolcyi*), and the ash psylla (*Psyllopsis fraxinicola*), another European species first recorded from this country in 1899 which appears to have about the same life cycle as the pear psylla, the adults wintering on the bark of the tree and the insects becoming abundant in June.

Brief notes on some of the more injurious or interesting species which came to the entomologist's attention during the year follow. Those mentioned under fruit insects are the pear slug, cigar case bearer, cherry fruit fly, lined red bug

(*Lygidea mendax*), pear psylla, San José scale, and blister mite. Those mentioned as affecting garden and grain crops are the rose scale, greenhouse leaftyer (*Phlyctænia rubigalis*), wheat wireworm (*Agriotes mancus*), and harlequin cabbage bug. Other insects mentioned are the elm leaf beetle (*Galerucella luteola*), bagworm, sugar maple borer (*Plagionotus speciosus*), elm scurfy scale (*Chionaspis americana*), false cottony maple scale (*Phenacoccus acericola*), large black carpenter ant (*Camponotus herculeanus*), Abbott's pine sawfly (*Lophyrus abbotii*), spotted Cornus sawfly (*Harpiphorus tarsatus*), blue Cornus sawfly (*H. versicolor*), spotted pine weevil (*Pissodes notatus*), snow white linden moth, birch leaf skeletonizer (*Bucculatrix canadensisella*), peach tree blight (*Pemphigus imbricator*), silver fir aphid (*Chermes piceæ*), blow fly (*Calliphora viridescens*), stable fly (*Muscina stabulans*), *Agromyza melampyga*, Coquebert's Otiocerus (*Otiocerus coquebertii*), etc.

In an appendix (pp. 82–104) the author reports studies made of pedogenesis in the cecidomyiid fly *Miastor americana*. This includes the history of pedogenesis, methods, embryology, a bibliography, etc.

Guide to the insects of Connecticut (*Conn. State Geol. and Nat. Hist. Survey Bul. 16, 1911, pp. 169, pls. 11, figs. 66*).—This is the first of a series of papers dealing with the insects of Connecticut. Part 1 (pp. 13–38), consisting of the general introduction by W. E. Britton, includes a bibliography of the more important works relating to North American entomology, a discusion of the abundance, habits, and haunts of insects, their distribution, the life zones of Connecticut, economic status, structure, growth, classification, etc. Part 2 (pp. 41–165), by B. H. Walden, deals with the insects of the orders Euplexoptera and Orthopetera that occur in Connecticut.

A handbook of the destructive insects of Victoria, with notes on the methods of prevention and extirpation, C. French (*Melbourne, 1911, pt. 5, pp. 169, pls. 40, figs. 4*).—This is the fifth of a series of volumes being published, of which the first 4 have been noted previously (E. S. R., 22, p. 253).

Contributions to the knowledge of insect pests, F. Silvestri (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 246–289, figs. 25; 5 (1911), pp. 287–319, figs. 26*).—The first paper deals with the elm leaf beetle (*Galerucella luteola*), its biology, natural enemies, etc., and includes a bibliography of 32 titles; the second paper with *Plusia gamma*, its biology, injury, and natural enemies, and includes a bibliography of 12 titles.

Insect enemies of the fig in Brazil and their control, H. von Ihering (*Chacaras e Quintaes, 3 (1911), No. 2, pp. 9–11, figs. 4; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1193–1194*).—*Azochis gripusalis*, *Trachyderes thoracicus*, *Stenoma albella*, and an undetermined cerambycid beetle are mentioned as enemies of the fig.

The enemies of medlar (Mespilus), P. Noel (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 2, pp. 453, 454*).—A list is given of the important insect enemies of medlar.

The insect enemies of sulla, T. de Stefani (*Bol. R. Orto Bot. Palermo, 9 (1910), No. 1–3, pp. 116–122*).—An account is given of the buprestrid beetle *Sphenoptera lineata* (*geminata*) and a lepidopteron which attack sulla, or French honeysuckle (*Hedysarum coronarium*), in Tunis and Sicily.

The life history of the walking-stick, Diapheromera femorata, H. H. P. Severin and H. C. Severin (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 307–320, figs. 3*).—In its natural habitat in Wisconsin, this walking-stick feeds upon the leaves of the hazelnut shrubs (*Corylus americana*) and to some extent upon the leaves of the linden (*Tilia americana*). In rearings made of 100 individuals of *D. femorata*, under conditions as nearly normal as possible and extended over a period of 4 years, it was found that 23 per cent molted 4 times,

76 per cent 5 times, and only 1 per cent 6 times. The period between molts was found under normal conditions to vary from 6 to 15 days, the first and last stadia being somewhat more prolonged than the intermediary ones.

"Specimens of Diapheromera, which molted 4 times, reached sexual maturity on an average, in 50.06 days, while individuals which molted 5 times required 57.56 days on an average, or an extra 6.6 days before beginning the egg-laying period. It is evident thus, that those walking-sticks which molted 4 times, omit the fifth molt and yet reach sexual maturity nearly a week earlier than those specimens that pass through 5 molts. In all probability, temperature plays an important rôle in the rate of development, but temperature alone does not explain why some walking-sticks molt 4 times and others 5 times. We have repeatedly reared a number of Diapheromera which were hatched on the same day, fed with the same kind of food and kept in the same breeding cage throughout their entire life history under exactly the same conditions of temperature, and yet some specimens molted 4 times while others molted 5 times. Further experiments are necessary to determine a solution of this problem."

It is said that the development of this walking-stick is often retarded by a leaf-ovipositing tachinid fly (*Phasmophaga antennalis*) and by an undetermined host-ovipositing species.

A bibliography of 103 titles is appended.

The effects of parasitic castration in Membracidæ, I. Matausch (*Jour. N. Y. Ent. Soc., 19 (1911), No. 3, pp. 194–196, pl. 1*).—The author records the finding of a large species of Telamona (near *heliria*) and *Carynota mera*, as well as *Thelia bimaculata*[1], infested with parasitic larvæ. This association of parasites with a malformation or inhibition of the development of the external genitalia is said to occur also in Glossonotus, 3 parasitized specimens belonging to this genus having been received. That parasites produce the sexual anomaly also in Cyrtolobus is shown by a specimen collected by the author at Woods Hole, Mass., on July 13. Attempts to breed the parasites to adults failed.

The California Christmas-berry tingis, C. Pemberton (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 339–343, figs. 18*).—The tingitid species here considered (*Corythuca arcuata*) is said to be common on hawthorn in the eastern United States and also on the apple and hawthorn in western Washington, where it is probably an introduced insect. Its presence on the Christmas berry (*Heteromeles arbutifolia*) can easily be detected by the brown, sunburned appearance of the under sides of the leaves. There are but few Christmas-berry bushes in the Santa Clara Valley that escape the attack of this insect. It is also found occasionally and sparingly on the live oak (*Quercus agrifolia*) where the trees are close to Christmas-berry bushes. Much damage to this bush results indirectly from the attack of this tingitid due to a black smut or fungus (*Capnodium heteromeles*), the spores of which readily grow in the honeydew excreted in large quantities by the nymph.

The nymph molts 5 times and gradually increases in size from 0.6 mm. to 2.6 mm. Under normal conditions in the Santa Clara Valley, the average life cycle is passed in about 78 days. As its period of activity lasts about 8 months, it seems very probable that there are but 3 broods a year. Where spraying has been attempted, success has resulted from application of kerosene emulsion to the foliage with underspray nozzles.

American Psyllidæ, III, IV, D. L. Crawford (*Pomona Col. Jour. Ent., 3 (1911), Nos. 1, pp. 422–453, figs. 4; 2, pp. 480–503, figs. 4*).—A continuation of the paper previously noted (E. S. R., 25, p. 53). Synopses are presented of the

[1] Jour. N. Y. Ent. Soc., 17 (1909), No. 4, p. 165.

genera of Triozinæ and Carsidarinæ, together with a general revised synopsis of the genus Trioza, and a synopsis of this genus based principally on the genitalia. Descriptions of 5 genera, 13 species, and 7 varieties new to science are included.

A new species of Aleyrodes living on the olive, F. SILVESTRI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 5 (1911), pp. 214–225, figs. 13*).—*A. olivinus*, which occurs in central and southern Italy upon the upper and rarely upon the lower surface of olive leaves, is described as new. It is parasitized by *Prospaltella olivina*, *Encarsia elegans*, and *Amitus minervæ*, the last-named being here described as new to science. Biological notes are included.

An account of Aphis brassicæ and some of its parasites and hyperparasites, G. MARTELLI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 5 (1911), pp. 40–54*).—*Aphidius brassicæ* and 5 species of syrphus flies, accounts of which are here presented, are the more important enemies of the cabbage aphis at Portici.

Two Rhopalosiphum species and Aphis pulverulens n. sp., C. P. GILLETTE (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 320–325, pl. 1*).—*A. pulverulens*, collected from *Symphoricarpos occidentalis* at Fort Collins, Colo., is described as new to science.

Host index to California plant lice (Aphididæ), E. O. ESSIG (*Pomona Col. Jour. Ent., 3 (1911), No. 2, pp. 457–468*).—A list of synonyms of California plant lice is appended to this host list.

Aphididæ of southern California, VI, VII, E. O. ESSIG (*Pomona Col. Jour. Ent., 3 (1911), Nos. 1, pp. 400–403, figs. 4; 3, pp. 523–557, figs. 18*).—A continuation of papers previously noted (E. S. R., 25, p. 53).

The natural enemies of the citrus mealy bug, III, IV, E. O. ESSIG (*Pomona Col. Jour. Ent., 3 (1911), Nos. 1, pp. 390–397, figs. 4; 3, pp. 518–522, figs. 3*).—A continuation of the paper previously noted (E. S. R., 24, p. 559). The author here considers the coccinellid beetles *Cryptogomus orbiculus*, *Scymnus guttulatus*, *S. sordidus*, *Rhizobius lopanthæ*, and *Hyperaspis lateralis*, and the hymenopterous parasite *Chrysoplatycerus splendens*.

Locomotion of certain young scale insects, H. J. QUAYLE (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 301–306*).—Experiments on the power of locomotion of the black scale, the red or orange scale, and the purple scale are reported.

"In the case of the black scale it was shown that about 4 ft. of ordinary orchard soil is about the limit that will be traversed by the active young. . . . The young red scale in attempting to ascend a small particle of earth falls back again and this is repeated time after time. The same is almost as true for the young purple scale. Where there is a fine mulch, therefore, the chances of the young red or purple scale reaching an adjoining tree is practically negligible."

Notes on Coccidæ, VI, VII, E. O. ESSIG (*Pomona Col. Jour. Ent., 3 (1911), Nos. 1, pp. 404–411, figs. 5; 2, p. 469*).—A continuation of papers previously noted (E. S. R., 24, p. 559). The author considers the frosted scale (*Eulecanium pruinosum*), Glover's scale, *Lecaniodiaspis rufescens*, and *Orthezia artemisiæ*.

The parasites of Mytilaspis pomorum, P. VOGLINO (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 228, 229*).—An account of the parasitic enemies of the oyster scale, which are prevalent in various parts of Piedmont, Italy, and have already checked its multiplication.

Grasserie in silkworms, M. N. DE (*Agr. Jour. India, 6 (1911), No. 3, pp. 292–295, figs. 2*).—Experiments show that the younger worms are more subject to attack by this disease than are the mature ones. More worms died when

injected with grasserie juice than when fed leaves stained therewith. The author finds that fresh juice is more virulent than juice which has been kept for some months.

The leopard moth as a pest of apple nursery stock, W. E. BRITTON (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 298, 299, pl. 1*).—The leopard moth was discovered in 1910 boring into the stems or trunks of apple trees in a Connecticut fruit-tree nursery, not far from the coast.

Note on the cork-colored orange tortricid (Platynota rostrana), E. R. SASSCER (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 297, 298*).—In 1909 this pest damaged some 15 per cent of the grapefruit in a grove at Key Largo, Fla.

Notes on the egg-laying habits and emergence of adult of Sanninoidea exitiosa, E. N. CORY (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 332–336, pl. 1*).—Observations made at College Park, Md., are reported.

Rhopalomyia grossulariæ n. sp., E. P. FELT (*Jour. Econ. Ent., 4 (1911), No. 3, p. 347*).—This new species was reared in May, 1911, at the Ohio Station from deformed gooseberry buds (*Ribes grossularia*).

Fruit flies and other insects attacking cultivated and wild fruits in New South Wales, W. B. GURNEY (*Agr. Gaz. N. S. Wales, 22 (1911), No. 8, pp. 722–727, pls. 2, figs. 2*).—This second paper deals with the Queensland fruit fly, its prevalence, the sequence of orchard and wild fruits attacked, and the extent of parasitism. The new parasite mentioned in the previous account (E. S. R., 24, p. 356), *Opius tyroni*, has been found to destroy from 4 to 52 per cent of the Queensland fruit flies developing in wild fruit. Only one parasite develops from a single maggot. This parasite occasionally infests maggots in orchard fruits and cage experiments have shown that it will also attack the Mediterranean fruit fly.

Transmission of disease by native blood-sucking insects, A. SCHUBERG and P. KUHN (*Arb. K. Gsndhtsamt., 31 (1911), No. 2, pp. 377–393; abs. in Sleeping Sickness Bur. [London] Bul., 3 (1911), No. 26, pp. 162–164*).—In this paper the authors deal with the rôle of the stable fly (*Stomoxys calcitrans*) in the transmission of trypanosomes and spirochetes. Previous attempts to transmit nagana, surra, jinja cattle disease, debab, souma, dourine, and sleeping sickness by means of *S. calcitrans* are reviewed. In experiments in which *Trypanosoma brucei, T. equiperdum, T. gambiense*, and *T. lewisi* were used, all but *T. lewisi* were mechanically transmitted to healthy animals by the stable fly.

A bibliography of 34 titles is appended.

Further researches on the development of Trypanosoma gambiense in Glossina palpalis, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B., 83 (1911), No. B 567, pp. 513–527, figs. 80*).—"In the course of the development of *T. gambiense* in *G. palpalis* the proboscis does not become involved, as in the case of some other species. A few days after an infective feed the trypanosomes disappear out of the great majority of the flies, but in a small percentage this initial disappearance is followed by a renewed development. After a very short time the flies which have fed on an infected animal become incapable of conveying the infection by their bites, and this noninfectivity lasts for some 28 days, when a renewed or late infectivity takes place. A fly in which this renewed or late infectivity occurs can remain infective for at least 96 days. An invasion of the salivary glands occurs at the same time as this renewal of infectivity, and without this invasion of the salivary glands there can be no infectivity. The type of trypanosome found in the salivary glands when the fly becomes infective is similar to the short stumpy form found in vertebrate blood, and it is believed that this reversion to the blood-type is a sine quâ non in the infective process."

Experimental transmission of trypanosomes by glossines (preliminary notes), [I, II], G. Bouet and E. Roubaud (*Ann. Inst. Pasteur, 24 (1910), No. 8, pp. 658–667; abs. in Sleeping Sickness Bur. [London] Bul., 2 (1910), No. 21, pp. 351–353*).—These papers deal with the transmission of *Trypanosoma cazalboui, T. dimorphon,* and *T. pecaudi* by *Glossina palpalis,* and of *T. cazalboui* by *G. tachinoides* and *longipalpis.*

Experimental transmission of trypanosomes by glossines, III, IV, G. Bouet and E. Roubaud (*Bul. Soc. Path. Exot., 3 (1910), Nos. 9, pp. 599–603; 10, pp. 722–725; abs. in Sleeping Sickness Bur. [London] Bul., 2 (1910), Nos. 22, pp. 393–395; 24, pp. 51–53*).—In continuation of the investigations above noted, these papers discuss respectively the transmission of *Trypanosoma pecaudi* by *Glossina longipalpis* and *G. tachinoides,* and the transmission of *T. dimorphon* by *G. palpalis, G. tachinoides,* and *G. longipalpis.*

Report on a recent addition to the insect fauna of the West Indies, A. Fredholm (*Proc. Agr. Soc. Trinidad and Tobago, 11 (1911), No. 7, pp. 342–352; abs. in Agr. News [Barbados], 10 (1911), No. 245, p. 298*).—A beetle, thought to be *Batocera rubus,* has become the source of injury to the mango (*Mangifera indica*), the avocado (*Persea gratissima*), and the India rubber tree (*Ficus elastica*) on the island of St. Croix, Danish West Indies. The original generic and specific descriptions are reproduced, together with new descriptions, drawn up by E. A. Schwarz of the Bureau of Entomology of this Department.

An enemy of the coconut palm in Samoa, K. Gehrmann (*Tropenpflanzer, 15 (1911), No. 2, pp. 92–98, figs. 6*).—A beetle, thought to belong to the genus Oryctes, is the source of serious injury to coconut palms in Samoa through attacking the crown.

Variations in diet among xylophagous Coleoptera of the family Bostrichidæ. Similarity of diet among Bostrichidæ and Scolytidæ adults, P. Lesne (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 10, pp. 625–628; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 745–747*).—"The Bostrichidæ are far from being exclusive in their choice of plants for nourishment, and not one of them is connected exclusively with a particular species. However, they seek especially the wood of trees belonging to certain botanical groups, such as Mimosa and Bambuseæ, and several other species, such as the vine and *Ficus carica.* On the other hand, the whole family of the Salicaceæ appears to be quite free from their attacks."

A preliminary contribution to the biology of Phytonomus variabilis, G. Martelli (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 5 (1911), pp. 226–230*).—*P. variabilis* was found by the author in April, 1909, at Portici, near Naples, and in 1910 at Acireale, Sicily, to be the source of serious injury to alfalfa through the larvæ and adults feeding upon the leaves. In this paper the author presents information upon its biology and parasites. At Portici the ichneumonid *Canidia curculionis* and 2 chalcidids (*Eulophus* sp. and *Eutelus sp.*) and at Acicastello, in Sicily, *C. curculionis* and *Pimpla maculator,* were found to parasitize the larvæ. Three hyperparasites were bred, namely, *Habrocytus* sp., *Chalcis* sp., and *Dibrachis boncheanus,* all parasites of *C. curculionis.*

Guide to bee keeping in British Columbia, F. D. Todd (*Dept. Agr. Brit. Columbia Bul. 30, 1911, pp. 52, pl. 1, figs. 23*).—Chapters are devoted to the apiarian possibilities of British Columbia, starting bee keeping, tools and dress, hives, the cycle of the bee year in British Columbia, diseases, etc., together with a list of bee keepers in the Province.

Foul brood among bees, L. Harris (*Dept. Agr. Brit. Columbia Bul. 31, 1911, pp. 15, pls. 3*).—A brief account of the disease and remedies, together with the text of an act for the suppression of foul brood passed in March, 1911.

Notes on the Hymenoptera Chalcidoidea, with descriptions of several new genera and species, A. A. GIRAULT (*Jour. N. Y. Ent. Soc., 19 (1911), No. 3, pp. 175–189*).—Among the 4 species here described as new to science is *Mestocharis williamsoni*, reared from conopid puparia taken from *Bombus americanorum* in Illinois. The author also records the rearing of *Arrhenophagus chionaspidis* from *Aulacaspis rosæ* at Urbana, Ill.; *Coccophagus lecanii* from a Lecanium scale on osage orange at Chicago; *Physcus varicornis* from the San José scale and scurfy scale at Urbana and from *Chionaspis americana* at Chicago; *Ablerus clisiocampæ* from San José scale and scurfy scale at Urbana; *Aphelinus mytilaspidis* from San José scale at Carbondale, Ill.; *A. fuscipennis* from San José scale at Carbondale, Ill., and from *Aspidiotus uvæ* at Anna; and *A. mali* from *Pemphigus fraxinifolii* at Urbana, Ill., and College Station, Tex. Three new genera, namely, Urios, Tumidiscapus, and Brachistella, are erected.

A new Sigalphus from Dacus oleæ, G. SZEPLIGETI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 5 (1911), p. 323*).—A new braconid parasite of the olive fly in the Transvaal is described as *S. daci*.

Two new braconids from Brazil, G. SZEPLIGETI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 5 (1911), pp. 285, 286*).—The two species here described as new to science are *Biosteres brasiliensis* and *B. areolatus*, both reared from pupæ of the trypetid *Anastrepha fraterculus* from São Paulo.

Papers on deciduous fruit insects and insecticides.—Notes on the peach and plum slug (Caliroa [Eriocampoides] amygdalina), R. A. CUSHMAN (*U. S. Dept. Agr., Bur. Ent. Bul. 97, pt. 5, pp. 91–102, pl. 1, figs. 3*).—This is a report of studies made largely in 1910 of the life history and habits of a sawfly which has been found by Rohwer to represent a new species (E. S. R., 25, p. 362). What is undoubtedly the same species, however, was discussed and figured by Morgan in 1897 under the name *C.* (*Selandria*) *obsoletum* (E. S. R., 9, p. 1065).

In 1910 the first adults were observed on April 1; on April 7, 5 eggs and 6 larvæ one-third grown were discovered. Observations seem to indicate that females normally infest the lower branches first, gradually working higher and higher as the destruction of the lower leaves progresses. Considerable difficulty was met with in breeding the species and a special method of procedure, which is described, was adopted and a special rearing cage designed. There appear to be 7 generations of the earliest individuals in the latitude of Tallulah. "Six of the 7 are summer generations and the seventh is the hibernating generation. Of the latest individuals of each generation there are probably not more than 3 or 4 summer broods." The eggs seem to be deposited in a cavity made by inserting the ovipositor in the leaf from the upper side, usually close to the midrib or one of the larger veins. The number placed in a single leaf may vary from 1 to 25. The incubation period of 74 eggs observed varied from 4 to 6 with an average of 4.9 days.

The larva grows rapidly molting 4 times during its growth. "The first instar is from less than 2 to 4 days in duration, averaging about 2 days. The second and third instars are of nearly like duration, and the fourth about 3 days in length, the total feeding period being about 9 or 10 days in duration in warm weather."

After molting for the last time the larva crawls or drops to the ground and burrows into the soil for from ½ in. to 3 in. and constructs an oval cell somewhat less than ¼ in. long in its greatest diameter. If the cell be opened the larva will be found to have changed its form, being shrunken to about one-half its original size and having lost the power of locomotion. In this stage, which is termed the "prepupa," it remains for a period of from 5 to 7 days before pupating, depending upon the temperature. In one case a living prepupa was found 28 days after the latest adult reared from the same lot of larvæ had

emerged. On October 20, after cold weather had set in, all of the cages were examined, and all of the living stages found were in the prepupal condition. From this it appears that the species must hibernate in this form.

"The pupal period varies in duration from 2 to 4 days, according to the temperature. . . . The total developmental period varies from 20 to 28 or 30 days in the majority of individuals, although in those individuals of each generation which hold over for a time after the normal time of emergence it may be from twice to several times as long as this."

A new ichneumonid parasite, described by Viereck[1] as *Hyperallus caliroæ*, was reared from the larvæ at Tallulah. The developmental period of this parasite is somewhat longer normally than that of its host. It enters the ground in the body of the host and develops within the pupal cell of the latter.

The author advises the use of an arsenical spray, such as arsenate of lead, in combating the pest.

Note on eradication of ticks by the starvation method, H. E. Laws (*Agr. Jour. Union So. Africa, 1 (1911), No. 4, pp. 570–579*).—A report of experiments conducted in continuation of those previously noted (E. S. R., 24, p. 360).

Tables showing the rôle of South African ticks in the transmission of pathogenic organisms and the longevity and developmental periods of the various stages of these ticks are appended.

Notes on the red spider attacking cotton in South Carolina, H. F. Wilson (*Jour. Econ. Ent., 4 (1911), No. 3, pp. 337–339*).—In observations made at Batesburg, S. C., from May 6 to August 16, 1910, *Tetranychus bimaculatus* was found to be altogether responsible for the damage to cotton. Observations of the life history and bionomics of this species are reported.

The efficacy of glass traps for the capture of insects, A. Truelle (*Rev. Hort. [Paris], 82 (1910), No. 16, pp. 376, 377; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 232*).—Less than 7.5 per cent of the Lepidoptera captured at Eisgrub, Moravia, by means of glass traps were injurious forms.

The use of saponins in the preparation of insecticide emulsions, etc., G. Gastine (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 9, pp. 532–534; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 754, 755*).—The fruit of *Sapindus utilis*, a tree which has been cultivated for a long time in Algeria, contains in its fleshy pericarp more than 50 per cent of a special saponin that is very soluble in water and alcohol. It is pointed out that saponins, unlike soaps, are not readily decomposed or precipitated by dilute acid liquids or by metallic bases, and can therefore be used where soaps can not. Mention is made of the fact that alkaline soaps, while giving stable emulsions, rapidly weaken the toxicity of oils of coal tar and of crude petroleum.

The author's experiments show that 20 gm. of powder of the pericarp of the Sapindus seed in 10 liters of water is sufficient to emulsify 700 gm. of coal-tar oil. The emulsion, which is very stable, is so fine that a very large proportion of it passes through filter paper; under the microscope it has the appearance of milk. Copper salts can be added to the emulsion of coal-tar oil without the superficial tension of the liquid being increased. The following formula is recommended: Water 10 liters, powder of Sapindus 20 gm., neutral acetate of copper 100 gm., and a mixture of coal-tar oil and petroleum of 1.0 density 200 cc.

The use of sodium cyanid, E. O. Essig (*Pomona Col. Jour. Ent., 3 (1911), No. 1, pp. 385–389, fig. 1*).—The author reports upon the use of sodium cyanid

[1] Proc. U. S. Nat. Mus., 40 (1911), pp. 189, 190.

in Ventura County, Cal., in 1910, where more than 20 tons were consumed. It was found to be as effective as potassium cyanid, is cheaper, and does not burn damp and cold foliage and fruit as readily.

Insecticides and insect control, H. J. QUAYLE (*California Sta. Circ. 66, pp. 7*).—Directions are given for the preparation and use of some 28 insecticides.

[A pest inspection act in Colorado] (In *Laws Passed 18. Sess. Gen. Assembly Colo. Denver, 1911, pp. 455–460*).—This act provides for the formation of pest inspection districts, under the general authority of the state entomologist.

FOODS—HUMAN NUTRITION.

Deterioration of eggs as shown by changes in the moisture content, A. D. GREENLEE (*U. S. Dept. Agr., Bur. Chem. Circ. 83, pp. 7, dgms. 2*).—A preliminary account is given of experiments in which the loss in moisture content of eggs was studied with relation to the age or condition of the egg. White Leghorn eggs 24 hours old, when the experiments began, were kept in a crate at 32° F. under commercial conditions and examined at intervals of from 1 to 3 months, while other samples were kept in pasteboard cartons at a higher temperature and examined at intervals of from 3 to 10 days.

A decrease in moisture was observed in the white, which "appears to be easily accounted for by evaporation to the external atmosphere, but the loss in weight as shown by means of the balance is not sufficient to account for the entire decrease in the percentage of moisture." This fact, together with the increase in moisture which was observed in the yolk, "suggests a transfer of water from white to yolk."

The author points out that this can not be definitely proved from the data reported with respect to moisture content. The determination of the Reichert-Meissl number of the extracted fat, however, did not indicate an increase of volatile fatty acids. This the author believes shows that there was no volatilization of fatty substance. An analysis of the dried sample showed the same percentage of nitrogen as that in the fresh sample calculated to a water-free basis, which makes it clear that there was no loss of nitrogenous or proteid matter. "By a process of mathematical calculation it can easily be shown that solids have not passed from the yolk to the white."

"This phenomenon of a transfer of water from the white to the yolk may easily be explained by the simple process of osmosis. . . . In the egg this process continues until the vitellin membrane becomes so weak that it breaks, when the white and yolk begin to lose their identity. This action proceeds with such definiteness that by a process of calculation, knowing the original weight of the egg, the loss in moisture to the external atmosphere can be calculated with surprising closeness to the actual loss shown by the balance. . . .

"The change in water content increases its rate with the temperature and diminishes with the time."

The author explains his method of calculation and the rate formula which he proposes. With reference to the application of his work, he concludes that "by means of the rate formula and one analysis of a sample of eggs it is possible to predict the condition of the eggs at any temperature for any given date within a reasonable holding period. The rate multiplied by the time gives the loss in weight, from which data it is a simple matter to find the percentage of moisture remaining."

Concerning the extractive material in beef kidney, K. BEBESCHIN (*Ztschr. Physiol. Chem., 72 (1911), No. 5–6, pp. 380–386*).—Carnosin, methylguanidin, and carnitin, which are characteristic of striated muscular tissue, were not

found in the kidney. Betain, another derivative of trimethylamin, replaced carnitin.

The nutritive effects of beef extract, W. H. THOMPSON, W. CALDWELL, and T. A. WALLACE (*Brit. Med. Jour., 1911, No. 2646, pp. 613–619*).—The conclusions which were drawn from the experimental study of meat extracts follow:

"The addition to the diet of the beef extracts used (commercial and self-made) led to an increase of body weight both in the case of animals and of man. Accompanying this increase there was a retention of a considerable proportion of the nitrogen given in the extracts. The extracts also caused a reduction in the output of nitrogen by the feces, this no doubt being due to a better digestion and absorption of food of the ordinary diet. The extracts may therefore be accredited with both a direct and an indirect nutritive value.

"During the feeding with the extracts there was also a retention of water in the body."

For earlier work see a previous note (E. S. R., 24, p. 168).

Fisheries of the United States, 1908 (*Bur. of the Census* [*U. S.*], *Spec. Rpts., Fisheries of the U. S. 1908, p. 324*).—A large amount of statistical data is summarized and discussed regarding the fishing industry of the United States, including Alaska. Among the subjects discussed are the products of the principal fisheries, canning and preserving, and exports and imports.

Is baked bread sterile? B. VON FENYVESSY and L. DIENES (*Ztschr. Hyg. u. Infectionskrank., 69 (1911), No. 1, pp. 223, 224*).—From their experiments the authors conclude that the interior of bread reaches a temperature of 94 to 104° C. during baking, so that nonspore-forming pathogenic bacteria, if accidently present in dough, would certainly be killed. Dough may contain spores, however, which are not thus destroyed, and it follows that bread is not of necessity sterile and it may happen that spores of pathogenic bacteria accidentally present in flour remain viable. Nevertheless, infection from such a cause is not known.

Studies in nutrition.—I, The utilization of the proteins of wheat, L. B. MENDEL and M. S. FINE (*Jour. Biol. Chem., 10 (1911), No. 4, pp. 303–325*).—As an introduction to a series of studies of the nutritive value of vegetable proteins, the authors discuss the factors which must be taken into consideration and point out that two distinct questions should be considered, namely, "the availability of the products existing more or less in their native condition, with accompanying structural elements, as in bread, [and] the specific utilization of the proteins themselves. The latter aspect is the one which primarily calls for further investigation."

In the experiments reported the attempt was made to control extraneous factors in so far as possible by improving the texture and mechanical condition of the crude products, or by purifying the individual products. The experimental trials with man and dogs indicate that wheat "glidin," gluten, and the two characteristic proteins of wheat, namely, gliadin and glutenin, are as thoroughly utilized as the nitrogenous components of fresh meat.

Studies in nutrition.—II, The utilization of the proteins of barley, L. B. MENDEL and M. S. FINE (*Jour. Biol. Chem., 10 (1911), No. 4, pp. 339–343*).—From experiments reported in continuation of the above it appeared that "under favorable conditions, barley protein, like that of the closely related cereal wheat, would be almost perfectly digested."

[Rice in relation to beriberi, in] epidemic dropsy in Calcutta, E. D. W. GREIG (*Sci. Mem. Med. and Sanit. Depts. India, n. ser., 1911, No. 45, pp. 3+II+47, pl. 1, charts 6, map 1*).—The investigations reported have to do with the cause and prevention of epidemic dropsy or beriberi and include studies carried on during an epidemic of the disease in Calcutta.

According to the author's conclusions, there is evidence to show that this "is a nutritional disease, and is brought about by a 'one-sided' dietary."

In this epidemic Bengalis were chiefly affected.

"A community (Marwaris), living in the heart of the affected portion of Calcutta, practically entirely escaped epidemic dropsy. A careful chemical analysis of their dietary, which differs materially from that of the Bengalis, shows that it is much richer in some important constituents,—phosphorus, etc., than a rice dietary, and, therefore, the quantity of these constituents taken by the Marwaris, amongst whom no fatal cases of epidemic dropsy have been recorded, is greater than that consumed by Bengalis, whose staple is rice, and who were very severely affected by epidemic dropsy in the recent outbreak. The better class European community in Calcutta, living on a 'mixed dietary', and not consuming large quantities of rice continuously, have escaped.

"Chemical analysis and histological examination show that by the process of 'polishing', as carried out in the steam and other mills at Calcutta and elsewhere, constituents essential for nutrition are removed from the rice, and that the ata (wheat) which many Bengalis consume habitually, had been so finely 'sifted' that it is deprived of these ingredients to an even greater extent than rice.

"The chemical examination of samples of the kind of rice consumed habitually by patients affected by epidemic dropsy shows that the samples had undergone a process of 'polishing' by steam milling and that important constituents had been removed to a considerable extent; that wheat consumed by patients affected by epidemic dropsy had undergone a considerable loss of phosphates in the preparation of ata."

To secure additional information as to the effects of faulty diet as a cause of disease, experimental studies were made with pigeons fed various kinds of rice and grain.

"When fed on 'polished' rices, both boiled and unboiled, a progressive loss of weight with characteristic polyneuritis" was shown by the pigeons. "Chemical analyses of these samples of rice show them to have a low phosphorus content.

"Control pigeons when fed on a mixture of wheat and pulses show no loss of weight, but rather a gain, and they have remained for months in good health. Chemical analysis of this food shows that it contains double the quantity of phosphorus contained in the sample of rice used for feeding the pigeons."

The hemolytic action of rice fat and a note on the hemolysis of fatty acids, J. SHIMAZONO (*Arch. Expt. Path. u. Pharmakol., 65 (1911), No. 5–6, pp. 361–366*).—Both the alcohol and the ether extract of rice show a hemolytic action. The substance causing this was isolated, studied, and identified as palmytic acid. The author raises the question as to whether the hemolytic power of certain lipoid bodies may not be ascribable to higher fatty acids mixed with them.

Baking experiments with potato flour, C. NAGEL (*Ztschr. Spiritusindus., 34 (1911), No. 30, pp. 375, 376*).—The general conclusion was reached that small amounts of potato flour, 5 to 10 per cent, can be used in making wheat bread, and that in making rye bread raised either with leaven or with yeast as much as 15 per cent can be used.

Concerning apple constituents, C. THOMAE (*Jour. Prakt. Chem., n. scr., 84 (1911), No. 16–17, pp. 247, 248; abs. in Chem. Zentbl., 1911, II, No. 13, p. 970*).—The author studied the characteristics of an oil obtained from apple peel which, combined with a little plant fat or resin, is the compound on the surface of apples which hinders evaporation.

Studies of citron, F. HÄRTEL and A. KIRCHNER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 6, pp. 350–353*).—Analyses are reported and discussed of 21 samples of candied citron. In the authors' opinion starch sirup is necessary for the production of a translucent product of good quality. The commercial custom, it is stated, is to use at least 40 parts by weight of starch sirup to 120 of sugar. The authors intend to study the question experimentally with a view to determining the proportion of starch sirup actually necessary.

The composition of sauerkraut, E. FEDER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 5, pp. 295, 296*).—Analyses of 4 samples of sauerkraut are reported.

The use of spices as preservatives, C. HOFFMAN and ALICE C. EVANS (*Jour. Indus. and Engin. Chem., 3 (1911), No. 11, pp. 835–838; Jour. Home Econ., 3 (1911), No. 5, pp. 452–459*).—According to the investigations it appears "that cinnamic aldehyde and eugenol as such possess considerable preservative action and aid materially in preserving substances to which they are added. Both are contained in such spices as cinnamon and cloves." The authors believe that the marked preservative action of these spices noted in their experiments must be attributed to their content of these essential oils. "As this preservative action takes place, even when the spices are used in the small quantities necessary for flavoring, their use can be recommended in contrast to such spices as pepper and ginger which have been shown to possess but little, if any, preservative action."

Special food analyses, 1910, R. E. ROSE and A. M. HENRY (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 103–113, table 1*).—Data are given regarding the analysis of a large number of samples of miscellaneous foods and beverages.

[Florida] pure food and drugs law (*1911, p. 14*).—The text is given of the pure food and drugs law approved June 5, 1911.

Standards of purity for food products [in Florida], B. E. MCLIN and R. E. ROSE (*Tallahassee: Dept. Agr., 1911, pp. 35*).—Standards are presented for the above law.

The meat and canned foods act as amended May 4, 1910, and the regulations made thereunder governing the inspection of meats (*Ottawa: Govt., 1910, pp. 32*).—The text of the act and regulations are given in full.

The meat and canned foods act as amended May 4, 1910, and the regulations made thereunder governing the inspection of preserved fruits, vegetables, and milk (*Ottawa: Govt., 1910, pp. 14*).—The full text is given.

Some kitchen tests to detect adulterations in common foods, E. H. S. BAILEY (*Bul. Dept. Food and Drug Insp. Mo., 3 (1191), No. 1–3, pp. 34–42*).—Directions are given for tests which require only a limited equipment and which can be carried out at home.

Standard of living among the industrial people of America, F. H. STREIGHTOFF (*Boston, 1911, pp. XIX+196; rev. in Survey, 27 (1911), No. 2, p. 1010*).—A summary and discussion of statistical data on this subject.

A bibliography is included.

Has the diet of the rural population in Germany changed materially? (*Arch. Deut. Landw. Rats, 35 (1911), pp. 593–619*).—The general conclusion reached in a consideration of this subject at a meeting of German agricultural councilors was that every effort must be made to impress upon the agricultural population the value of milk and milk products.

Prison diet in Finland, C. TIGERSTEDT (*Arb. Physiol. Inst. Univ. Helsingfors, 1910, p. 163; Hyg. Rundschau, 21 (1911), No. 14, pp. 812, 813*).—The average energy value of the daily diet in Swedish prisons was found to be 3,557 calories, of which 54 per cent is supplied by bread. Nitrogen metabolism experiments of

a week's duration, made with 10 persons, showed that nitrogen equilibrium was maintained, or even small gains made, on the diet furnished. Information is also summarized regarding diet in Sweden, Norway, Denmark, and Russia.

Some questions of metabolism and nutrition, A. GIGON (*Münchn. Med. Wchnschr., 58 (1911), No. 25, pp. 1343–1347, dgm. 1; abs. in Zentbl. Biochem. u. Biophys., 12 (1911), No. 4–5, p. 118*).—In the author's opinion his experiments show for the first time that the greater part of the carbon of food protein remaining after the cleavage of urea is converted into fat in the normal organism and in smaller quantities into carbonhydrates.

Concerning protein metabolism, II, F. FRANK and A. SCHITTENHELM (*Ztschr. Physiol. Chem., 73 (1911), No. 3–4, pp. 157–175, dgms. 2*).—The conclusion reached is that, provided digestion has been properly carried on and the material obtained properly dried, protein does not lose its value for protein formation by artificial digestion continued to abiuretic cleavage.

Experimental studies on creatin and creatinin.—I, The rôle of the carbohydrates in creatin-creatinin metabolism, L. B. MENDEL and W. C. ROSE (*Jour. Biol. Chem., 10 (1911), No. 3, pp. 213–253*).—A general conclusion from the investigations reported and discussed in detail is that without question the metabolism of creatin is intimately associated with carbohydrate metabolism.

Experimental studies on creatin and creatinin, W. C. ROSE (*Proc. Soc. Expt. Biol. and Med., 8 (1911), No. 5, pp. 127, 128*).—A brief account of the above.

Experimental studies of creatin and creatinin.—II, Inanition and the creatin content of muscle, L. B. MENDEL and W. C. ROSE (*Jour. Biol. Chem., 10 (1911), No. 3, pp. 255–264*).—An increase in the percentage of creatin in the muscles of rabbits and a hen during inanition was noted. This may be ascribed to a removal of the noncreatin portion of the muscle, leaving the creatin intact, or to an increased formation of creatin, the latter seeming to the authors the more plausible explanation.

Experimental studies of creatin and creatinin.—III, Excretion of creatin in infancy and childhood, W. C. ROSE (*Jour. Biol. Chem., 10 (1911), No. 3, pp. 265–270*).—Considerable quantities of creatin were found in the urine of children of 5 years and over; indeed, with the exception of two cases creatin was present in all the samples examined from children under 15 years of age. The diet in most cases presumably contained more or less meat.

"It is possible, therefore, that the oxidation or conversion of creatin into creatinin may be difficult for young individuals to accomplish, and in this case the creatin of the urine may, in part, represent ingested creatin; or the glycogenic functions may be imperfectly developed and the store of carbohydrates be insufficient to exert its regulatory influence over metabolism during childhood."

The balance of acid-forming and base-forming elements in foods, and its relation to ammonia metabolism, H. C. SHERMAN and A. O. GETTLER (*Proc. Soc. Expt. Biol. and Med., 8 (1911), No. 5, pp. 119, 120*).—Continuing earlier work (E. S. R., 19, p. 763), ash analyses were made of a number of foods, and from the percentage of total sulphur, phosphorus, and chlorin on the one hand, and sodium, potassium, calcium, and magnesium on the other, the excess of acid over base, or base over acid, resulting from the oxidation of the food, was calculated. Previous ash analyses were also studied and supplemented by such determinations as were necessary to permit the calculation of this balance for a wide range of food materials.

"Meats and eggs show a predominance of acid-forming elements; in fruits and vegetables the base-forming elements predominate. From this standpoint the fruits and vegetables tend to balance the meats of the diet. Milk and the

cereals contain acid-forming and base-forming elements in more nearly equivalent proportions."

Samples of corn bred through 10 generations for high and low protein content, respectively, obtained from the Illinois Experiment Station, were studied with reference to their ash constituents. "The ash analyses of these were very similar except for the higher sulphur content of the high protein corn, which resulted in this sample showing a slight predominance of acid-forming elements, while in the low protein corn the base-forming elements predominated."

To determine to what extent the excess of acid brought into metabolism by the oxidation of the food is neutralized in man by ammonia, a test was made in which the influence upon ammonia excretion of a known change of diet was studied quantitatively, the change being a substitution of rice for potatoes in a simple mixed diet. This it was calculated was equivalent (excluding the feces but allowing for the unoxidized sulphur excreted during each period) to the introduction of 28.3 cc. normal acid per day. "The increased ammonia excretion was equivalent to 10.7 cc. normal acid per day. Thus, only about $\frac{1}{3}$ of the extra acid introduced by the change of food was eliminated as ammonia salt."

Concerning lecithin metabolism, A. Bickel (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 3 (1911), No. 2, pp. 171–179*).—From the metabolism experiments with a man reported the conclusion was reached that the lecithin phosphorus taken was resorbed and assimilated.

The effect of the melting point of fat upon the rapidity with which it leaves the stomach, F. Tangl and A. Erdélyi (*Biochem. Ztschr., 34 (1911), No. 1–2, pp. 94–110; abs. in Zentbl. Biochem. u. Biophys., 12 (1911), No. 4–5, p. 133*).—Linseed oil, olive oil, lard, and beef tallow were the fats studied in experiments with dogs.

From the experimental data it appeared that the rapidity with which fat left the stomach was dependent upon its viscosity. The lower the melting point the greater is the viscosity, the more the fat clings to the stomach, and the longer the period it remains in the stomach. Differences were especially noticeable shortly after the fat was taken.

Concerning fat resorption, A. von Fekete (*Pflüger's Arch. Physiol., 139 (1911), No. 4–5, pp. 211–233; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 16–17, p. 730*).—From his experiments the author concludes that fat is resorbed in solution only, and solely by means of the lymphatics.

Experiments on the resorption of gelatin in the small intestine, D. Minami (*Biochem. Ztschr., 34 (1911), No. 3–4, pp. 261, 262; abs. in Zentbl. Biochem. u. Biophys., 12 (1911), No. 4–5, p. 134*).—Gelatin solutions digested with pancreas were rapidly and apparently more quickly resorbed than those digested with pepsin hydrochloric acid.

Experiments on the relation of the thyroid to diet, R. Hunt (*Jour. Amer. Med. Assoc., 57 (1911), No. 13, pp. 1032, 1033*).—The data reported, according to the author, afford "additional experimental support for the view that certain diets have specific effects on the thyroid glands of some of the lower animals."

On the stimulating effect of chlorid of calcium and of intestinal mucous membrane extract on the action of trypsin, E. Hekma (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 13 (1910–11), pt. 2, pp. 1002–1012*).—The following conclusions were drawn from the author's experimental study of this subject:

"The experiments described . . . have shown that chlorid of calcium can increase to a considerable extent the activity of trypsin which contains no trypsinogen. This promotive effect of chlorid of calcium on trypsin should not be confounded with the activating effect of chlorid of calcium on trypsinogen, which latter property is ascribed to this salt by several authors.

"The extracts of the intestinal mucous membrane were also found to possess the property of being able to increase the action of trypsin, to a smaller extent, however, than chlorid of calcium. The substance originating in the intestinal mucous membrane, which brings about this action, is not destroyed by being boiled, and is in all probability not calcium. Besides a substance which, as we know, possesses the faculty of being able to activate trypsinogen, which substance is rendered inactive by being boiled, the intestinal mucous membrane contains, therefore, also another substance which has the power of stimulating active trypsin, a substance which is not rendered inactive by being boiled."

Influence of intake of food on gaseous metabolism and energy production, A. GIGON (*Pflüger's Arch. Physiol., 140 (1911), No. 11–12, pp. 509–592*).—The body carries on its fundamental processes of metabolism independently of the time when food is taken. The work of digestion, however, exercises some effect, and even in cases of fasting is a small factor. Taking carbohydrates or protein produces intermediate effects under ordinary conditions. Part of the sugar taken is changed into fat, and protein also leads to an increase in fat. An action, specific both in the direction of energy production and in metabolic effects, is exercised by each costituent of the diet and manifests itself whether the substances are taken alone or mixed together.

The heat of combustion of compounds of physiological importance, A. G. EMERY and F. G. BENEDICT (*Amer. Jour. Physiol., 28 (1911), No. 6, pp. 301–307*).—Determinations of the heat of combustion at constant pressure are reported of dextrose, levulose, lactose, maltose, glycogen, alanin, allantoin, and glutaminic acid.

Owing to differences in the type of apparatus used and the development of technique, a comparison of the results with those of earlier investigators is not deemed advisable. "It is hoped, however, that they may be of value in computing the energy transformations in experiments made either with or without the respiration calorimeter. While the energy value of normal urine may be approximately obtained from the nitrogen content, yet in certain cases of pathological urine, as, for instance, in diabetes, one should know that for every gram of β-oxybutyric acid excreted per day there is a loss of 4,693 calories; this must be ultimately taken into consideration with fully as much care as is now customary in computing the energy lost in the urine through the sugar excreted."

Experiments on the physiology of the stomach in man, C. MANTELLI (*Arch. Ital. Biol., 55 (1911), No. 2, pp. 236–256*).—According to the author's experiments, gastric secretion of psychic origin is very greatly diminished after marked muscular fatigue. Repose tends to induce normal conditions, and after 3 hours' repose this secretion may be regarded as normal. The gastric juice secreted after fatigue has a very low digestive value. In the case of mental fatigue the conditions are of the same character but perhaps more pronounced than in the case of physical fatigue.

Formation of dental "tartar" by dissociation of the carbophosphates of saliva, A. BARILLÉ (*Jour. Pharm. et Chim., 7. ser., 3 (1911), No. 12, pp. 582–585; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 586, II, p. 741*).—The mineral matter of dental tartar includes 70 per cent of tricalcium phosphate and 8 per cent of calcium carbonate, derived, the author believes, from saliva. The saliva contains 5 or 6 gm. per liter of mineral matter, consisting of magnesium and calcium carbonates and phosphates. It gives a precipitate of these constituents when made alkaline or exposed to air, the reason being that carbon dioxid is then removed from dissolved carbophosphates.

The urine of man and animals and other body secretions and fluids, edited by C. NEUBERG (*Der Harn sowie die übrigen Ausscheidungen und Körperflüssigkeiten von Mensch und Tier. Berlin, 1911, vols. 1, pp. XXXIX+955,*

figs. 103; 2, pp. 956–1823, figs. 121, tables 3).—The two volumes making up this handbook contain articles contributed by a number of authors, among others the following: The General Examination of Urine, by P. Mayer; The Determination of the Inorganic Constituents of Urine, by S. Fränkel; The Study of the Nonnitrogenous Organic Constituents of Urine, by C. Neuberg; The Nitrogenous Constituents of Urine, by A. C. Andersen; The Chemical Examination of Feces, by O. Schumm; and The Calorimetry of Urine and Feces, by A. Loewy.

Chapters are included giving directions for carrying on metabolism experiments with man and animals, etc., as well as special chapters or sections on milk colostrum and other body secretions or fluids.

Some energy factors of the urine excreted after severe muscular exercise, H. L. Higgins and F. G. Benedict (*Amer. Jour. Physiol., 28 (1911), No. 6, pp. 291–300*).—The experimental work reported emphasizes the importance of studying the carbon-nitrogen and calorie-nitrogen ratios in urine, and a method of determining the heat of combustion of the carbon of urine is given.

"The carbon-nitrogen and calorie-nitrogen ratios of a number of urines passed after a severe, long-distance running race are reported. The values for 12 out of 18 urines were essentially normal; the remaining 6 urines gave high ratios, probably due to perverted protein metabolism.

"In view of the fact that the calorie-carbon ratio is constant, the advantage is pointed out of the development of either a volumetric method or a wet process by which determinations of carbon in urine can be simply, quickly, and accurately made."

A method for the quantitative determination of fecal bacteria, H. A. Mattill and P. B. Hawk (*Jour. Expt. Med., 14 (1911), No. 4, pp. 433–443*).—From results of which the data reported form a part it appears, according to the authors, "that the amount of bacterial nitrogen in the feces is a valuable index to intestinal conditions, and the method herein described is a simple and satisfactory one for making this determination. It involves three serial centrifugalizations of a 2-gm. sample of the fresh feces brought into suspension in 0.2 per cent hydrochloric acid. The bacterial suspension finally obtained is concentrated and extracted by alcohol, and nitrogen is determined in the precipitated material. The complete data on a given stool can be obtained in about 5 days, and one operator can take care of 3 or 4 stools in duplicate in 1 day.

"On an absolutely uniform diet of simple and easily digested food during a period of 3 to 4 weeks, the average amount of bacterial nitrogen in two subjects was found to be 53.9 per cent of the total fecal nitrogen, and this percentage, though higher than that obtained by workers heretofore, is probably more nearly a true value for bacterial nitrogen, because no ether extraction was employed.

"The average daily amount of dry bacteria, calculated on the basis of the nitrogen values, is 8.27 gm."

ANIMAL PRODUCTION.

Heredity in relation to evolution and animal breeding, W. E. Castle (*New York and London, 1911, pp. XII+184, pls. 14, figs. 20*).—This work is based on lectures given in 1910 at the Graduate School, Ames, Iowa, and at the Lowell Institute, Boston, Mass. There is a brief introduction to the science of genetics, which is followed by a full and lucid treatment of the application of Mendel's law and its probable value in the formation of new and improved breeds better adapted to the conditions of present-day agriculture. It is pointed out that an empirical knowledge of breeding, which has been the main

reliance of the past, is soon to be replaced by principles discovered through scientific research.

The genesis of animal species, L. CUÉNOT (*Le Genèse des Espèces Animales. Paris, 1911, pp. 496, figs. 123; rev. in Rev. Gén. Sci., 22 (1911), No. 14, pp. 585, 586*).—The topics treated in this book are the study of individual adaptation, variation, effective environment, adaptation of species, mutations, and the evolution of species by preadaptation or prophetic characters.

Memorandum for committee on pedagogics of breeding, W. M. HAYS (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 349–352*).—This contains many suggestions for teaching the principles of breeding, and in particular the use of illustrative material.

Intra-individual variation and heredity, R. PEARL (*Advance print from Proc. Internat. Zool. Cong., 7 (1907), pp. 3*).—Intra-individual variation is defined as the variation between the different members of a series of like parts of the same organism. A preliminary report is made of a biometrical study of like members in the hydroid *Aglaophenia helleri* to determine whether the correlation there corresponds in magnitude to those observed for ancestral inheritance among individuals.

The work so far indicates that the processes of production of like parts of a series by an individual and the production of like individuals through the activity of germ cells must be regarded as biological processes very closely akin, if not fundamentally identical. "The only distinction between them which it seems possible now to make is that in one case the products of cell division remain permanently in contact with one another to form a single system, whereas in the other case the products of cell division at some step in the process of development separate completely from the system which produced them and thereafter lead independent existences. So far as the process of production is concerned this distinction does not appear to be fundamental."

An important principle in selecting for fancy points, W. J. SPILLMAN (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 375–380, figs. 2*).—The author points out that because it is so much more difficult to breed for two characteristics than for one, progress in improving the utility characters would be much more rapid if the standard for esthetic characters was fixed at that normal for the breed, than at present when both esthetic and utility characters must be considered.

Inheritance in "blood lines" in breeding animals for performance, with special reference to the "200-egg hen," R. PEARL (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 317–326, fig. 1*).—It is pointed out that the performance record is in itself a poor indication of the breeding value or prepotency of the individual.

From a study of individual pedigrees in egg production, the author suggests the following as a working hypothesis regarding the methods of inheritance of a group of highly variable characters in domesticated animals, denoted as "performing ability": "Inheritance of performing ability is in blood lines, and is fundamentally in accordance with the pure line idea of Johannsen; a genotypic high degree of performing ability tends to be dominant over a genotypic low degree of performing ability with phenomena of segregation in subsequent generations."

Selection and pathology, J. U. DUERST (*Arb. Deut. Gesell. Züchtungsk., 1911, No. 12, pp. 54, pls. 12*).—It is pointed out that the inheritance of malformations and other pathological conditions, such as is exhibited in crested fowls, in the legs of the dachshund, and in digital abnormalities gives rise to new species and breeds if the environment, either artificial or natural, is favorable.

A bibliography is appended.

The significance of the pathological in inheritance and selection, E. JOEST (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 26, pp. 461–463, fig. 1*).—A critical review of the article noted above.

On graft hybrids, C. C. GUTHRIE (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 356–373, figs. 10*).—A review of work done in transplanting ovaries by different investigators. A bibliography is appended.

[Experiments in hybridizing animals], W. J. SPILLMAN ET AL. (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 131–134*).—This is a report of the committee on work in animal hybridization now being conducted in the United States, both by private individuals and institutions. A list of state experiment stations and the nature of the breeding work at each is given.

The fertility of the hybrids of Bos taurus and Bison americanus, E. IWANOFF (*Biol. Centbl., 31 (1911), No. 1, pp. 21–24*).—On a Russian estate crosses were made with *Bos taurus* and *Bison americanus*. The female offspring were fertile, but the male half-breeds were sterile. Males of three-quarters Bison blood were fertile. When a three-quarter Bison was crossed with a one-quarter Bison the offspring produced, called a half-bred Bison by the author, were fertile.

On the question of the fertility of horse hybrids, zebroids, and hybrids between the domestic horse and Equus przewalskii, E. IWANOFF (*Biol. Centbl., 31 (1911), No. 1, pp. 24–28*).—Offspring of both sexes produced by crosses between the domesticated horse and *E. przewalskii* were fertile, but the male offspring of the domesticated horse and mountain zebra were infertile. The results of other investigators with these hybrids, the causes of infertility, and the relationship between the different species of *Equus* are discussed.

Bibliography of animal hybrids, F. B. MUMFORD (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 282, 283*).—This includes hybrids among the birds and mammals only, and most of these refer to domesticated species.

[Physiology of the cell], A. B. MCCALLUM (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 740–755*).—This is the address of the president of the section on physiology of the British association in 1910.

It is pointed out that the study of the cell has been largely morphological, and that the generalization drawn from these studies can give but little insight into the chemical constitution or the physiological properties of the cell. Digestion experiments on cells are also misleading. What is needed is a more definite knowledge regarding the nature of osmosis, surface tension, and chemical reactions taking place inside of the living cell. The author found that inorganic salts are not diffused uniformly throughout, their localization being due to the action of surface tension. Explanations are given for the belief that the energy concerned in secretion, excretion, cell division, muscular contraction, and the production of nervous impulses are manifestations of surface tension.

The new force—mitokinetism, M. HARTOG (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 628, 629*).—A discussion of the possible causes which are concerned in the formation of the spindle during mitosis. The author finds that the phenomena can not be accounted for by osmosis, currents, electrolytic, electrostatic, or other forces unknown outside the living cell.

Experimental zoology. II, Regeneration. III, Phylogeny, H. PRZIBRAM (*Experimentalzoologie. Leipsic and Vienna: II, Regeneration (Wiedererzeugung), 1909, pp. 338, pls. 16; III, Phylogenese (Artbildung) inklusive Hereditat, 1910, pp. 315, pls. 24; rev. in Biol. Centbl., 31 (1911), No. 11, pp. 346–352; Nature [London], 86 (1911), No. 2164, pp. 238, 239*).—These volumes comprise parts 2 and 3 of a work, the first part of which has been previously noted (E. S. R., 21, p. 771). Part 2 discusses in great detail the phenomena of regeneration in all types of animals, from reproduction in unicellular organisms

to the reparation of tissues in vertebrates. In part 3, under the title of phylogeny, are treated the problems of heredity.

In a discussion of the criteria of species the author lays stress upon the importance of testing the blood cells and other physiological tests. A valuable feature of the work is a long list of experiments in hybridizing.

On the growth of embryonic chick tissues in artificial media, agar, and bouillon, MARGARET R. LEWIS and W. H. LEWIS (*Bul. Johns Hopkins Hosp., 22 (1911), No. 241, pp. 126, 127; Anat. Rec., 5 (1911), No. 6, pp. 277–293, figs. 24; Jour. Amer. Med. Assoc., 56 (1911), No. 24, pp. 1795, 1796*).—A detailed report of investigations on the growth of tissues taken from the embryo of a chick, in which it was found that they could be grown in many kinds of media, sodium chlorid being the one essential salt. The character of the growth of the different tissues and the methods used are given in full.

On the formation, significance, and chemistry of the white and yellow yolk of ova, O. RIDDLE (*Jour. Morph., 22 (1911), No. 2, pp. 455–485, pls. 3, fig. 1*).—Measurements of the rate of growing ova of the common fowl were made by feeding the fat stain Sudan III.

The growth of ova smaller than 6 mm. was so slow that a measurable deposit of the stain was not obtainable. After rapid growth began, the normal interval until the breaking of the egg from the follicle (ovulation) ranged from 5 to 8 days. The radii of the ova increased about 2 mm. in length in each 24 hours. White yolk, wherever found, was thought to be a stage in the formation or disintegration of yellow yolk and was deposited during poorer nutritive conditions obtaining in the later hours of the night (1 to 5 a. m.). White yolk contained more water, protein, and extractives, and less fat and phosphatid than yellow yolk. In digestion by the embryo or by the follicle cells fat and phosphatid were broken down more rapidly than was protein. The mechanism of yolk formation and disintegration was the same and involved 2 factors, (a) the reversible action of enzyms, and (b) the coefficients of the several constituents of yellow. The presence of the native lipochrome coloring matter (vitellolutenin) in large spirals of yellow yolk only is probably due to the fact that these spirals contain much fat and the lipochrome pigment is soluble in fat. The yellow did not originate from the nucleus of the egg cell or from the nuclei of the follicle cells.

Elementary treatise on stock feeds and feeding, J. E. HALLIGAN (*London and Easton, Pa., 1911, pp. VI+302, figs. 24*).—A work on commercial and home-grown stock feeds, the principles of animal nutrition, and practical suggestions for feeding horses, cattle, sheep, swine, and poultry.

The groundnut (Voandzeia subterranea) and its value as a feeding stuff, M. ZAGORODSKY (*Tropenpflanzer, 15 (1911), No. 8, pp. 413–436, figs. 5*).—This contains a description of a groundnut sometimes called the Madagascar peanut, and a report of a metabolism experiment with wethers in which the unshelled nut was fed in connection with hay. The coefficients of digestibility were protein 84.2, fat 100, nitrogen-free extract 84.3, and fiber 25.6 per cent. The analysis of the unshelled nut was as follows: Water 15, protein 17.9, fat 3.9, nitrogen-free extract 49.1, fiber 10.7, and ash 3.4 per cent.

Contribution to the study of molasses feed, CROCHETELLE and MILON (*Rev. Chim. Indus., 22 (1911), No. 261, pp. 279–285*).—Analyses of proprietary and molasses feeds are reported and their feeding value discussed. After keeping for several years there was considerable loss of dry matter, especially sugar.

Molasses food from skins of pressed grapes and molasses, O. FALLADA (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 3, pp. 407–410; abs. in Chem. Abs., 4 (1910), No. 23, p. 3272*).—The author points out the advantage of using the grape pulp obtained from the wine press and mixed

with molasses as a food for animals. This feed has been successfully produced in Italy and France. The average composition of such a product is as follows: Water 20.31, protein compounds 7.84, amido acids 3.91, ether extract 3.09, sucrose 9.57, invert sugar 1.91, raffinose 0.71, nitrogen-free extract 20.6, crude fiber 26.52, ash 5.41, and sand 0.13 per cent.

Inspection of feeding stuffs, E. L. BAKER ET AL. (*New York State Sta. Bul. 340, pp. 197–295*).—Analyses are reported of cotton-seed meal, linseed meal, malt sprouts, dried distillers' grains, dried brewers' grains, malt germ, gluten feed, hominy feed, barley feed, beef scrap, cooked meat scrap, alfalfa meal, pea meal, buckwheat screenings, corn meal, hominy grits, dried beet pulp, rice bran, poultry feeds, and mixed feeds.

It is stated that the feeding stuff trade in the State is in a very unsatisfactory condition because there are so many so-called compounded feeds, some of which contain inferior materials. Oftentimes they contain screenings, weed seeds, and oat hulls, and in some cases even sand, as high as 8.6 per cent of silica and sand being found in one sample of oat clippings.

[Analyses of feeds], A. DEVARDA (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 4, pp. 374, 375*).—Analyses are reported of molasses feed, dried slop, rice feed meal, and rape, sunflower, pumpkin, sesame, linseed and coconut cakes.

Manual of farm animals, M. W. HARPER (*New York, 1911, pp. XXV+545, pl. 1, figs. 177*).—This is a practical guide to the choosing, breeding, and keeping of horses, cattle, sheep, and swine. The common diseases of live stock are also briefly treated. The author's purpose is to discuss the general care and management of farm animals rather than the breeds.

[East Anglian breeds] (*Mark Lane Express, 105 (1911), No. 4160, pp. 825, 827, 829, 831, 844, 864, pls. 3, figs. 9*).—An account of the origin, history, and characteristics of several breeds of stock which originated in the counties of Norfolk and Suffolk, England, including the Red Polled cattle, Suffolk horse, Suffolk sheep, and Large Black pig.

On skulls of oxen from the Roman military station at Newstead, Melrose, J. C. EWART (*Proc. Zool. Soc. London, 1911, II, pp. 249–282, figs. 29; abs. in Proc. Zool. Soc. London, 1911, I, Abs. 90, p. 2*).—In addition to the crossbed animals at Newstead the author found 5 distinct types of oxen, (1) Celtic short horn type, (2) longhorn Urus type, (3) oxen with the occiput of the *Bos acutifrons* type, (4) oxen with a convex forehead, and arcutated intercornual ridge and horns curving outwards and backwards, and (5) hornless oxen of 2 distinct types, one with a nearly flat forehead and nearly straight intercornual ridge and square occiput, and the other with an uneven forehead ending in a pronounced mesial prominence.

In a comparison of these types with others in the British Museum the author comes to the following conclusions, based to a large extent on the character of the premaxillæ, the occiput, and the temporal fossæ: That the Celtic Shorthorn (*B. longifrons*) is probably more closely related to the zebu of India (*B. indicus*) than to the European urus (*B. primigenius*); that long premaxillæ are usually correlated with an occiput of the *B. primigenius* type, while short premaxillæ are usually correlated with an occiput of the *B. acutifrons* type; that polled-black Galloway cattle and polled-white "wild" Cadzow cattle are intimately related to the urus; that the white-polled Somerford, and the round-polled Aberdeen-Angus cattle with the premaxiliæ extending well up between the maxillæ and nasals, may be the descendants of an Oriental race allied to a modern Syrian breed apparently in the act of losing the horns; and that some of the cattle in the south of Scotland during the Roman occupation were descended from an Indian race allied to *B. acutifrons*.

The origin and ancestry of the black and white cattle [of Holland], F. DETTWEILER (*Mitt. Deut. Landw. Gesell., 26 (1911), Nos. 33, pp. 446, 447; 34, pp. 473–476; 35, pp. 480–485*).—From historical evidence the author concludes that there were 3 principal types of cattle in Europe, (1) the red German, (2) the black and white Celtic, with red and white variations, and (3) the gray Alpine cattle. The red and white cattle of Holland and along the shores of the North Sea to the east were crossed with the black and white breed from Jutland at about the end of the eighteenth century, giving rise to the black and white cattle of Holland and Holstein at the present time. This evidence is also substantiated by experiments of the author in breeding, who found that black was dominant to red.

The origin and ancestry of black and white cattle, GROSS (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 37, pp. 508–510*).—A discussion of the views expressed in the article noted above.

Results from breeding grade Shorthorns to Hereford bull, P. E. FOGLE (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 373–375*).—A report on results obtained in the inheritance of coat color when white grade Shorthorn cows were mated with pure-bred Herefords.

The results obtained to date indicate that a cross between red and white gives roan; that the roan cow having received red from one parent and white from another transmits the red to about half of its offspring and white to the other half; and that the solid red or nearly solid red cows have inherited the red from both parents, as their offspring showed no other color than red. An exception to this was a roan calf from a cow which was yellow with a little white. The inheritance of the eye ring was variable but on the whole appeared to be inherited with a solid red color.

The age factor in register-of-merit Jerseys, E. N. WENTWORTH (*Amer. Breeders Mag., 2 (1911), No. 2, pp. 97–103, figs. 3*).—In an examination of Jersey cows in the Register of Merit, with reference to their sire's age, it was found that 46.8 per cent were sired by bulls under 3 years of age. The average age of sires was 4 years 6 months, and the average age of daughters at the time of record was the same. The coefficient of correlation between age of sire and production of cow was ±0.6647.

By dividing the sires into 3-age groups it was found that in only one case did the oldest group of sires lose anything to the younger, in spite of the large number of younger animals. In a majority of cases there was a direct correlation between the high lactation of the cow and the merit of the calf which preceded this period, and there was a relatively large number of bulls which seemed to sire most of their Register-of-Merit daughters within one season.

"Another interesting point lay in the relative influence in inheritance between the bull and the cow in the production of sons capable of siring Register of Merit daughters. Without transposing the records to the basis of the above work, a coefficient between the sire and son of 0.821 existed, while the transposed records gave a relationship of 0.862. Taking the latter relationship with the cow the coefficient 0.0727 was derived. This would show a slightly stronger influence for the bull, but as the number of cases was smaller with the cows the probable error would be enough larger to nearly neutralize this difference. This should set at rest the minds of many dairymen who believe that a dairy bull from a high performing cow is of more value as a sire than a bull whose daughters have proven worthy of registry. It furthermore brings a closer harmony with the theory of the equal potency of parents, something which practical men have hesitated to accept.

"In conclusion it may be said that deductions from this work are practically impossible. While the introductory curves are somewhat surprising, a

detailed study fails to show a strong correlation between any age of sire and maturity or production of the offspring. The premises may not be correctly taken, but it seems to the writer they are nearly enough so to assure him of the lack of age as a factor in the conditions studied."

The cattle trade of western Canada, J. G. RUTHERFORD (*Rpt. Vet. Dir. Gen. Canada, 1910, pp. 106–113*).—A brief history of the Canadian range and methods of raising and finishing market cattle in the Northwest.

The maintenance ration of cattle, H. P. ARMSBY (*Pennsylvania Sta. Bul. 111, pp. 3–20*).—An outline of the present state of knowledge on this subject in continuation of work previously noted (E. S. R., 10, p. 1079). The maintenance ration is defined and its significance to the farmer and for scientific investigation is pointed out. On the basis of recent work by different investigators the author believes that 0.5 lb. of digestible crude protein and an energy value of 6.2 therms per day is a reasonably accurate estimate for the average maintenance ration for thin cattle per 1,000 lbs. live weight. The factors affecting the maintenance requirement are discussed.

What cooperation has done for sheep breeding in Tennessee, J. E. HITE (*Amer. Breeders Asso. [Proc.], 6 (1910), pp. 330–333*).—An account of a movement which began 30 years ago among the sheep breeders of Tennessee to improve their flocks by better breeding and to bring the producer and consumer of wool and mutton nearer together.

The searing iron v. the knife for detailing lambs, J. W. MATHEWS (*Agr. Gaz. N. S. Wales, 22 (1911), No. 7, pp. 566–568*).—Results obtained at 4 experimental farms showed but little difference between the 2 methods of castrating lambs except in the nature of the wounds. Those which were seared showed comparatively a much greater inflammation and took much longer to heal.

Shepherds of Britain: Scenes from shepherd life past and present, ADELAIDE L. J. GOSSET (*London, 1911, pp. XXIV+331, pl. 1, figs. 60*).—This book consists of pastoral folklore gathered from various sources, which record the life and customs of the British shepherd and his dog from the earliest times. There is considerable information concerning old breeds of sheep, habits of sheep and sheep dogs, customs and pastimes of shepherds, the famous sheep shearings of Holkham, and other events connected with the sheep industry and the wool harvest.

Investigations on sterility in goats, J. EGGERS (*Untersuchungen über in den letzten Jahren zahlreich beobachtete Fälle von Befruchtungsunfähigkeit bei Ziegenböcken. Inaug. Diss., Univ. Leipsic, 1910, pp. 19, pls. 3*).—In an histological examination of 6 bucks of the Saanen breed that were unable to reproduce offspring no spermatozoa were found. Spermatozoa were formed, but lost their power to fertilize and in some cases their motility because of the abnormal condition of the testicular secretions.

Potato flakes prepared from pressed potatoes (papka) in swine fattening experiments, RICHARDSEN (*Deut. Landw. Presse, 38 (1911), Nos. 74, pp. 849, 850; 75, p. 866; 76, pp. 873, 874, figs. 2*).—In this test with 6 swine potato flakes were compared with pressed potatoes as a supplement to a basal ration consisting of ground barley and meat meal. Both rations were deficient in lime and phosphoric acid. Neither lot produced carcasses of the first class.

Prenatal growth of the pig, L. G. LOWREY (*Amer. Jour. Anat., 12 (1911), No. 2, pp. 107–138, figs. 5*).—The prenatal growth of the body and the relative growth of the various organs were studied in 22 litters of pigs.

From the results obtained and comparative figures for man, rabbits, rats, and chicks the author concludes that "all these forms agree with the general law that the rate of growth is by far most rapid at the beginning of prenatal life,

decreasing at first rapidly, then more slowly, throughout prenatal and postnatal life. . . . During prenatal life the total weight of the body and the relative weight of the gonads are greater in the male, while the relative weight of the liver is usually greater in the female."

The wild and domesticated Suidæ of Sardinia and Corsica, E. L. TROUESSART and E. G. DEHAUT (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 8, pp. 471–473*).—A brief description of the wild and domesticated varieties of pigs.

Objects and results of swine registration, C. A. WILLSON (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 341–349*).—A summary of the aims of the different swine breeders' associations in the United States, in which a comparison as to the stress laid upon each part of the hog, as shown by the score card of the record associations, is presented in tabular form. The comparative results of measuring the value of an animal by its pedigree and by its individual characteristics are discussed, and it is pointed out that if a pedigree is to be of value in the future it must contain more information than it does at present. An advanced registry for swine is advocated in which prolificacy, and other desirable qualifications can be recorded.

Distribution of licensed stallions in the counties of Wisconsin during 1911, A. S. ALEXANDER (*Wisconsin Sta. Circ. Inform. 28, pp. 99*).—This is a directory of owners of stallions and jacks licensed in Wisconsin in 1911 with a brief account of the Pure Bred Sire League movement and other matters relating to horse breeding.

The Boulonnais breed, J. ASHTON (*Breeder's Gaz., 60 (1911), Nos. 14, pp. 619, 620, figs. 2; 15, pp. 683, 684, figs. 2; 16, pp. 751, 752; 17, pp. 815, 816, figs. 4; 18, p. 879, figs. 2*).—An account of the origin and characteristics of this valuable breed of horses, which it is stated has not been fully appreciated except in the region lying north of Paris where it originated. The operations on large breeding farms are described.

Poultry breeding in South Australia, D. F. LAURIE (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 42–50*).—A brief account of the progress which has been made in recent years in poultry breeding in South Australia, and in particular the history of the White Leghorn breed and what it has accomplished since its introduction from England.

Data on the direction of the cross, C. A. ROGERS (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 455–459, fig. 1*).—Experiments are reported with reciprocal crosses of White Leghorns and Barred Plymouth Rocks. A pen of pure White Leghorns and one of pure Barred Plymouth Rocks were kept as checks for comparison with the crosses. Apparently the male had more influence on the size of the egg, size of the day-old chick, nature of the feathering of the chick, size of the offspring, and the style of the feathering and furnishings of the offspring, whereas the influence of the female was stronger on the less apparent characteristics such as the rapidity of development, rate of maturing, and prolificacy.

Researches on the bacterial flora of old eggs, A. CHRÉTIEN (*Hyg. Viande et Lait, 5 (1911), No. 9, pp. 517–528*).—The eggs examined were known on the market as stale but not spoiled. Out of 52, 20 were found to be free from microbes. In 12 cases the germs were found in the yolk, in 6 cases in the albumin, and in 14 cases in both yolk and albumin. Besides a number of unidentified species there were moulds, Streptococci, Staphylococci, the coli type, the paracoli type, *Bacillus fluorescens nonliquefaciens*, and *B. prodigiosus*.

Trussing and boning chicken for fancy trade, W. A. LIPPINCOTT (*Iowa Sta. Bul. 125, pp. 3–18, figs. 18*).—The details of the methods for transforming a common chicken into an extra fancy product, ready for stuffing and roasting,

that often retails as high as 50 cts. a pound, are described and illustrated. "A pigeon, prairie chicken, or even a second chicken cut up and included in the dressing adds greatly to its palatability. With the boned bird it is possible to cut slices of chicken which include light and dark meat and dressing. Turkeys and guineas may be boned as readily as chicken. Ducks are a little more difficult, particularly if they are very fat. The bones in cases make elegant soup stock. They are often demanded by the purchaser for this purpose."

Contribution to the knowledge of breeds of pigeons founded on pathological characters, H. Otto (*Beiträge zur Kenntnis der Pathologisch Begründeten Unterscheidungsmerkmale bei Taubenrassen. Inaug. Diss., Univ. Bern, 1910, pp. 52, figs. 5; rev. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 11–12, pp. 434–436*).—A study of pouters, tumblers, and other breeds of pigeons the distinguishing characteristics of which are so abnormal as to be considered pathological.

DAIRY FARMING—DAIRYING.

The theory of dynamic heredity in the light of data gathered from the dairy herd of the Missouri Agricultural College, F. S. Putney (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 310–317*).—This is a study of the pedigrees for 4 generations of 44 Jersey cows at the Missouri Station in order to test Redfield's dynamic theory (E. S. R., 24, p. 772).

The average age of dams of cows producing over 400 lbs. of fat in 1 year was 5 years, 8 months, and 6 days; of those producing under 250 lbs., 5 years, 7 months, and 20 days. The average age of the granddams on the sire's side of cows producing over 300 lbs. of fat per year was 7 years, 9 months, and 16 days; of those producing between 250 and 300 lbs., 6 years, 4 months, and 3 days; of those producing under 250 lbs., 8 years, 1 month, and 14 days. The average age of 31 cows that exceeded their immediate dams in yield of milk fat was 5 years, 8 months, and 17 days, and the average age of 13 cows falling below their immediate dams was 5 years, 11 months, and 1 day.

From these data it is apparent that there was no advantage in breeding from old cows, and hence Redfield's theory is not substantiated.

Cooperative breeding of milking Shorthorns in Minnesota, W. F. Handschin (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 301–307*).—An account of the plan of circuit breeding by which this Department, the Minnesota Experiment Station, and a cooperative association of farmers are developing a subbreed of milking Shorthorns.

Text-book of cow-testing associations, B. Marquart (*Lehrbuch des Milchvieh-Kontrollwesens. Berlin, 1911, pp. VI+446, figs. 74*).—This treats of the origin of cow-testing associations and their value to the dairy industry, methods of organizing and testing herds, keeping records, the factors influencing milk secretion, and the Gerber, Sal, and other methods and apparatus used for testing for fat.

The Danish cow-test associations, B. Böggild (*Amer. Breeders Assoc. [Proc.], 6 (1910), pp. 287–295*).—A brief history of these associations and the methods of organizing, testing, and feeding herds under observation. A list of fodder units is given.

Investigations on the effect of palm-nut cake on milk production, O. Kellner (*Ber. Landw. Reichsamte Innern [Germany], 1911, No. 21, pp. 35*).—A general report on cooperative experiments conducted at 9 stations and involving 186 cows.

A change in the ration from peanut meal and maize to palm-nut cake as a supplement raised the fat content perceptibly but not the quantity of milk.

The increase in both the absolute and relative amount of fat was greater with cows giving a high yield of milk. The chemical constants of the fat were changed, the saponification number being raised while the iodin and solidifying point were lowered. The effect of the palm-nut cake on the character of the milk fat was slow, but remained for some time after the cake was discontinued. About 2 kg. of the cake per 500 kg. of live weight of the animal is recommended as a ration for milch cows.

The effect of feeding with coconut cake and linseed cake on the composition of butter fat, H. T. CRANFIELD (*Analyst, 36 (1911), No. 426, pp. 445–449, figs. 2*).—Two lots of 4 crossbred Shorthorn cows each were fed a basal ration of mangels, oat straw, chaff, bran, dried grains, rice meal, and hay. As a supplement all the cows received during the first week 5 lbs. of undecorticated cotton cake daily, and in the second and third weeks lot A received 5 lbs. of coconut cake and lot B 4½ lbs. of linseed cake. These two supplements were reversed the fourth and fifth weeks, and for the last week all the cows were fed as during the first week.

The average constants of the milk fat during the coconut-cake period were as follows: Lot A, refractive index at 35° C. 44.2, Reichert-Meissl number 29.5, Polenske number 3.3; lot B, refractive index 45.4, Reichert-Meissl number 30.2, Polenske number 2.9. During the linseed cake period lot A had a refractive index of 46.2, Reichert-Meissl number 29.1, Polenske number 2.3; lot B, refractive index 47.7, Reichert-Meissl number 29.1, Polenske number 1.7. In the cotton-cake period the refractive index was 46.4, Reichert-Meissl number 30.8, and Polenske number 2.3.

The cakes appeared to have a different effect on the keeping properties of the butter fat. The samples were kept in small corked bottles or flasks, and it was noticed that after several weeks butter made during the linseed and cotton cake periods had turned white and rancid, while that from the coconut cake period showed only a slight change. This preservative effect is an advantage in favor of the coconut cake. There was no very great difference shown in texture and flavor of the two sets of fresh butter, although as a rule the butter from the coconut cake was firmer and of a better flavor than the linseed cake butter.

"The feeding of coconut cake to dairy cows produced a butter which gave a refractometer figure below the normal, while the Polenske number was very high. The Reichert-Meissl number was, however, quite normal. Feeding with linseed cake influenced the butter in respect to the Polenske number, butters from this source giving a figure much below the normal. The refractometer figure was also influenced, a distinct rise being noticeable. Coconut cake produced a butter of good quality, possessing better keeping properties than butter from linseed or cotton cakes. The Shrewsbury and Knapp method for detection of coconut oil in butter possesses practically no advantages over the Polenske method."

The influence of feeding cotton-seed meal upon the composition of the fat in butter, A. J. SWAVING (*Rev. Gén. Lait, 8 (1911), Nos. 20, pp. 457–465; 21, pp. 486–493*).—After tests of the value of Halphen's reaction with authentic samples of cotton-seed oil and with mixtures of the oil and butter, the author details the results of three feeding tests with cows which were conducted during the years 1901 and 1902. The presence of cotton-seed oil could be noted in the butter fat after the first day, and it remained in the fat yielded for several days after ceasing to feed the cotton-seed meal. In the fat up to 5 per cent of cotton-seed oil could be detected with Halphen's reagent. By feeding cotton-seed meal no influence was exerted upon the yield of fat, the Reichert-Meissl number, or the refractive index.

Milk; its analysis and utilization, A. MONVOISIN (*Le Lait, son Analyse, son Utilisation. Paris, 1911, pp. X+286, figs. 40*).—The various chapters of this book deal with the chemistry of the milk constituents, the composition of milk from various animals, the changes in the composition of milk due to infection or adulteration, physical and chemical methods for preserving milk, and some special chapters dealing with unsweetened and sweetened condensed milk, powdered milk, milk for infant feeding, etc. The official French analytical methods are included.

[Analyses of milk and its products], A. DEVARDA (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 4, pp. 363–373*).—Analyses are reported of milk, cream, butter, cheese, kefir, kumiss, skim milk, diabetic milk, whey, condensed milk, powdered milk, and casein.

Investigations on the surface tension in milk and the nature of the membranes surrounding the fat globules, H. BAUER (*Biochem. Ztschr., 32 (1911), No. 5–6, pp. 362–379*).—Surface tension was found to be largely dependent on the percentage of fat. The depression by cooling was due to the congealing of the fat, as previously reported by Burri and Nussbaumer (E. S. R., 22, p. 413). The tension was nearly restored by heating for three-quarters of an hour at 50° C. It can be readily ascertained whether or not milk has been previously cooled by comparing the surface tension as measured by a stalagmometer before cooling and after cooling the milk for 1 hour at 10° C.

The fat globules were thought to vary somewhat in chemical composition and to be surrounded by a membrane the resistance of which to thermal and mechanical influences is weakened when the milk is acidified or becomes abnormal from any cause.

The composition of East Hungarian sour cream, J. ADORJÁN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 5, pp. 297–300*).—Thirty-five samples of such sour cream from cow's milk and 1 from sheep's milk were analyzed.

Experiments in the production of sanitary milk, H. ATWOOD and N. J. GIDDINGS (*West Virginia Sta. Bul. 134, pp. 81–105, pls. 4*).—A study of the sources of contamination of milk in the udder and during the process of cooling.

The germ content of milk was much greater after passing over the milk cooler. A steam tight compartment to enclose the cooler and bottling machine was then constructed in the form of a box divided with doors convenient to operate. After turning live steam into the enclosure for 15 minutes the cooler ceased to be a source of contamination. To further test the efficiency of this treatment sterile water instead of milk was allowed to flow over the cooler and was found to contain on the average 2 bacteria per cubic centimeter, but when the cooler was left open and merely washed and scalded the average number was 11,400 per cubic centimeter.

From these experiments it is concluded that the ordinary milk cooling devices are not nearly so efficient as they should be for keeping down the bacterial count of milk, but that by properly closing such apparatus and subjecting it to live steam, as described above, it ceases to be a source of contamination and the beneficial effects of cooling are much greater.

Bacterial counts were made of the first milk, middle milk, and strippings, and although the first milk and strippings contained far more bacteria than the middle portions it should not be assumed that the strippings should be left. The bacterial counts of the milk from the different quarters showed pronounced differences both in the amount of milk and bacteria, but the order of differences exhibited in one animal may be reversed in another. Where the number of bacteria was high the amount of milk is usually small, and where the number of bacteria is small the amount of milk is large. This test demonstrated the

importance of watching the bacterial content of each quarter of the udder for the production of high-grade milk.

Several tests were made to discover some practical method of reducing the number of bacteria present in any given quarter of the udder. Sealing the teats of the udder with carbolated vaseline after milking reduced the number of bacteria somewhat, but the procedure is not recommended until further tests have been made. Injecting the udder with dioxygen or with glycothymolin reduced the number of bacteria, but subsequent irritation renders these methods useless, since the number shortly after ceasing the injection was greater than in the first place and the quarters became slightly inflamed.

In order to determine how nearly germ-free milk can be produced, a few tests were carried out with the cow used in the teat-sealing experiment. Six samples of milk, from which the strippings and first few streams were rejected, contained on an average only 35 bacteria per cubic centimeter. Bacterial counts of the colostrum drawn from a heifer with a first calf showed an average number of organisms present, with a greater tendency to increase in the front quarters than in the hind quarters. Future investigations along these lines are promised.

An inexpensive homemade milk refrigerator, A. F. HESS (*Collected Studies Research Lab. Dept. Health N. Y. City, 4 (1908–9), pp. 148–151, figs. 2*).—An ice-box to be used in the home for keeping bottled milk cool in the summer time is illustrated and described.

A handbag refrigerator for the uncontaminated carrying of milk samples, C. B. FITZPATRICK (*Collected Studies Research Lab. Dept. Health N. Y. City, 4 (1908–9), pp. 152–155, figs. 6*).—The author describes a handbag for carrying milk samples in bottles with metal screw tops in such a manner that contamination of the samples will not occur after the ice melts.

Methods and results of paraffining cheese, C. F. DOANE (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 181, pp. 16*).—Continuing previous work (E. S. R., 18, p. 78), the methods ordinarily practiced in paraffining cheese are described, and a study of the faults common to paraffined cheese is reported. The investigations were made at a factory in Wisconsin with cheese of the "daisy" type.

The average shrinkage in cheeses paraffined directly from the press was 0.5 lb. per cheese, those paraffined when 3 days old 0.16 lb., and at 7 days 0.09 lb. The average weights when scored after being in storage about 5 months were 21.31 lbs., 21.28 lbs., and 20.97 lbs., respectively. On the basis of these figures apparently nothing was saved in the matter of shrinkage by paraffining directly from the press as compared with paraffining at 3 days of age, and at the latter period the cheese was decidedly of better quality, but there was a very noticeable difference in the final weights and the loss sustained between cheese paraffined at 3 and at 7 days of age.

After about 5 months in storage 8 lots of cheese were examined and the quality of the paraffin coat graded on the basis of 100 for a perfect coat, with the following results: The average score of those paraffined directly from the press was 90.7, at 3 days of age 94.3, and at 7 days 94.6. At the time of scoring it was noticed that practically every cheese paraffined at the time it came from the press was covered with blue mold on the surface of the paraffin. No definite reason is offered as to why this mold appeared, although it is suggested that possibly some whey found its way through the paraffin covering and furnished the necessary conditions for its growth. "Cheese paraffined from the press does not get the color of the rind as quickly as when the color is allowed to develop before paraffining."

The temperature of the paraffin and the length of dipping were tested with the cheese paraffined at 3 days from the press. Uniformly good results were

obtained at 220° F. and higher temperatures, whether dipped for 1, 5, or 10 seconds. At 190° the results were usually unsatisfactory, and when this temperature is used the cheese should be dipped for at least 5 seconds, though the cheese paraffined at 7 days was given practically the same average score as that paraffined at 3 days, the fault known as "rind rot" was more frequent than in the 3-day lot. Cheese kept in the warm curing room for several days after paraffining took on a white appearance which was noticeable at the time of scoring, but no reduction was made for this because of its even distribution. In order to prevent this change in color cheese should not be allowed to remain in the warm curing room for more than 1 day after paraffining. The amount of paraffin adhering to the cheese varied with the different temperatures and the length of time the cheese was immersed.

It is concluded that paraffining is an effective method of preventing losses in the weight of cheese due to evaporation and of preventing growth, the best results being obtained by paraffining at 3 days from the press. When cheese is held for some time before being paraffined it must be allowed to remain in the paraffin for a longer time in order to prevent the growth of mold under the paraffin coat.

VETERINARY MEDICINE.

Report of government veterinary bacteriologist for the year 1908–9, A. THEILER (*Rpt. Govt. Vct. Bact. Transvaal, 1908–9, pp. 163, pls. 7, figs. 5*).—The papers presented in this report are as follows: *Anaplasma marginale*, the Marginal Points in the Blood of Cattle Suffering from a Specific Disease (pp. 7–64), including (1) further inoculation experiments with South African redwater, (2) the marginal points in the literature on piroplasmosis, (3) the association of *Piroplasma bigeminum*, *Anaplasma marginale*, and *P. mutans* in South African cattle, (4) transmission of *A. marginale* by ticks, (5) the anaplasmosis of cattle, a summarized description of the disease resulting from the foregoing and observations from practice, and (6) gall sickness; and The Infectivity of Blood of Animals Suffering from Chronic Glanders (pp. 65–73), by A. Theiler; Gauw Ziekte, A Disease of Sheep (pp. 74–99), by J. Walker; Investigations into the Disease Lamziekte of Cattle (pp. 100–109) and The Refractive Index of Horse Sera (pp. 110–114), by W. Frei; On a Collection of Anopheles made at Onderstepoort in the Autumn of 1909 (pp. 115–121), by L. H. Gough; Experimental Studies on a Specific Purulent Nephritis of Equidæ (pp. 122–158); and Some Experimental and Epidemiological Observations on a Particular Strain of Pleuro-pneumonia (pp. 159–163), by K. F. Meyer.

Lactic acid ferment therapy, ROSENTHAL (*Arch. Gén. Méd., n. scr., 4 (1910), Aug., pp. 385–422; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 11, pp. 981, 982*).—A discussion in regard to the principles of lactic acid bacterio-therapy, its medical and surgical future, and its application to some diseases.

In regard to the theory of disinfection, R. O. HERZOG and R. BETZEL (*Ztschr. Physiol. Chem., 67 (1910), No. 4–5, pp. 309–313; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1911), No. 20–22, p. 755*).—Antiseptics either combine with the protein or have a solvent action for the fatty or lipoid bodies of the microorganisms. Chloroform and silver nitrate are taken up by yeast with particular reference to their absorption exponents. Formaldehyde always combines with yeast in the same proportions, irrespective of the concentration of the formaldehyde solution. Phenol is not taken up by this organism.

Gaseous disinfection, A. CORSINI (*I Disinfettanti Gassosi. Florence, 1909, pp. IV+256; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1911), No. 18, p. 549*).—This book, which was designed for practical work, after discussing the

literature in regard to the action of gaseous substances upon bacteria considers the theoretical treatment of the micro-organisms by halogen, nitrogen, and oxygen compounds, phenol, methane, and ethereal oil vapors, formaldehyde and sulphurous acid. The remainder of the book treats of the practical methods of disinfection with formaldehyde, particularly without apparatus.

The spontaneous oxidation of arsenical dipping fluids, A. V. FULLER (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 182, pp. 8*).—The author's investigations show that sodium arsenite in dipping fluids may undergo oxidation to arsenate through the agency of a micro-organism or organisms not yet identified.

"This oxidation may be quite rapid and in time proceeds practically to completion. The velocity of the reaction is dependent, of course, upon the number of the organisms introduced and upon their rate of multiplication, the latter being determined by the nature and quantity of organic matter present, the temperature, and, in short, all the agencies which influence bacterial growth. Inasmuch as the organism or organisms in question have not as yet been identified, it is impossible to state at present just how they gain access to the baths. There are several channels through which the inoculation might be effected, namely, through the water used in preparing the solutions, through the air, or through excrementitious or other matter derived from the cattle which pass through the dip. In view of the fact that the conditions to which the baths are exposed in actual practice are necessarily subject to wide variations, it is difficult to set a limit to the time which a given dip might be allowed to remain idle without undergoing alteration. However, it would appear safer to discard any batch of dip which is more than a few weeks old unless there is positive evidence that it retains its original concentration of actual sodium arsenite. Efforts will be made to isolate the causative agent of this phenomenon and to study its properties."

Practical bacteriology, blood work, and animal parasitology, E. R. STITT (*Philadelphia, 1910, 2. ed., rev. and enl., pp. XIII+345, pls. 4, figs. 87*).—Among the topics treated in the section on bacteriology are apparatus, culture media, staining methods, study and identification of bacteria and molds, bacteriology of water, air, and milk, and practical methods in immunity; in the portion on the study of blood are micrometry and blood preparations, and normal and pathological blood; and in the section on animal parasitology are classification and methods, the protozoa, flat and round worms, the Arachnoidea, mosquitoes and other insects, and poisonous snakes. The clinical bacteriological part also includes animal parasitology of the various body fluids and organs, contains diagnoses of infections of the ocular region and nasal cavities, examination of buccal and pharyngeal material, sputum, urine, feces, blood cultures and blood parasites, stomach contents, pus, skin infections, cytodiagnosis, rabies, and vaccinia. The work also has bacteriological keys, zoological tables, and an appendix which deals with miscellaneous topics. (See E. S. R., 20, p. 1079.)

About the activity of bacteria (aggressins) during infection, E. WEIL (*Ergeb. Wiss. Med., 1 (1909), No. 1, pp. 33–44; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 11, p. 983*).—Tests with fowl cholera bacilli on rabbits and guinea pigs showed that chicken cholera immune serum does not act through the agency of bacteriolysins nor immuno-opsinins (bacteriotropins), but by stimulating the aggressins to inhibit the multiplication of bacteria, in this way preventing infection and death. Comparative tests with the anthrax bacillus and the hay bacillus showed the latter to have an affinity for aggressins.

Artificial immunization in nonbacterial diseases, S. P. BEEBE (*Jour. Amer. Med. Assoc., 55 (1910), No. 20, pp. 1712–1717; abs. in Ztschr. Immunitätsf. u.*

Expt. Ther., II, Ref., 3 (1910), No. 8, p. 839).—This is a general review in regard to the present status of the topic.

About precipitating sera, B. Veyburg (*Ztschr. Fleisch u. Milchhyg., 21 (1911), Nos. 4, pp. 101–105; 5, pp. 147–150; 6, pp. 175–179; 7, pp. 211–215*).—After an extensive review of the existing literature on this subject, the author gives his results of a comparative study of the Uhlenhuth (E. S. R., 21, p. 108), Friedemann, Leers,[1] and Fornet-Müller methods.[2]

The preliminary treatment of animals according to the Friedemann, Uhlenhuth, and Leers methods was found to be very effective, with the exception that the Uhlenhuth and Leers methods were greatly dependent upon the individual susceptibility of the rabbit and the number of injections given. No relation could be noted between the degree of emaciation, the anaphylactic shock, and the precipitin formation. The Fornet-Müller rapid method is not recommended by the author.

Some tests were also conducted to determine the sensitiveness of the precipitin test for detecting various kinds of flesh (horse, bovine, sheep, hog) in homologous extracts. The best sera were still capable of detecting the protein in dilutions up to 1:8.

In regard to the inhibition of precipitation by precipitoids, W. Spät (*Biochem. Ztschr., 28 (1910), No. 1, pp. 7–15; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1911), No. 20–22, p. 753*).—The inhibition caused by inactivated immune or normal sera is not due to a combination between the inactive serum (precipitoid) and the bacterial extract. Both substances were found, after a long period of activity, to be in a free state.

The sensitiveness of complement towards ferments, L. Michaelis and P. Skwirsky (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 4, pp. 497–506; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 1–2, pp. 14, 15*).—Specific hemolysis is inhibited by pure proteolytic ferments. As the amboceptor is not destroyed by the ferments the authors infer that they exert their action upon the complement and also upon the middle and end pieces of the complement system. The protein nature of both of the parts of the complement is thus proved, but the authors point out the fact that it has not yet been established whether another chemical component, nonprotein in nature, is active with the complement.

In regard to the bactericidal action of normal and immune sera and normal and immune leucocytes (separated and in Wright's mixture) upon Staphylococcus pyogenes aureus, Bacillus anthracis, and the Pneumococcus, H. Dold and W. Muff (*Arb. Path. Anat. u. Bakt., Path. Anat. Inst. Tübingen, 7 (1910), No. 2, pp. 273–279; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 1–2, p. 10*).—The results show that the bactericidal action of rabbit serum against the anthrax bacillus in vitro is far greater than that of pigeon serum. Both of the sera act bactericidally towards *S. pyogenes aureus*, but not so markedly as they do against the anthrax bacillus. The immune serum from rabbits was bactericidal toward the pneumococcus. In the presence of serum the leucocytes (Wright's mixture) either do not act bactericidally at all, or when they are bactericidal the action is far below that of the serum itself.

It is pointed out that the physiological solution used in the Wright's test for the bacterial emulsion is in itself bactericidal against the above mentioned

[1] Methoden und Technik der Gewinnung, Prüfung und Konservierung des zur forensischen Blut- bzw. Eiweissdifferenzierung dienenden Anti-Serums. Berlin, 1908, pp. 31.
[2] Ztschr. Biol. Tech. u. Methodik, 1 (1908), pp. 201–206.

organisms. When a double amount of pigeon serum was employed the bactericidal action against the anthrax bacillus was increased, while the use of a double amount of leucocytes had no effect whatever.

The bactericidal action when present in Wright's mixture is, therefore, only a transitory one and is probably due to the serum only.

The value of the specific anaphylaxis reaction for the biological differentiation of proteins, B. BACHRACH (*Vrtljschr. Gerichtl. Med. u. Öffentl. Sanitätsw., 3. ser., 40 (1910), No. 2, pp. 235–271; abs. in Chem. Abs., 5 (1911), No. 4, p. 720*).—This is an investigation of the quantitative value of the anaphylaxis reaction, the effect of diphtheria toxin on the sensitization, the specificity of the phenomenon, the differentiation of proteins of closely related species and chemically different proteins from the same species, and the action of normal serums when injected intravenously.

It was found that diphtheria toxin when injected at the same time with an extract from a blood spot for sensitizing purposes increases the sensitization but decreases the specificity. The author considers that the reaction can not, therefore, for the present at least, be considered seriously for medicolegal purposes. It was also found that the serum from a monkey could not be positively differentiated from human serum, nor was the author able to differentiate the serum protein of a cow from the casein or albumin of cow's milk.

A contribution to the question of the bacterial content of the muscles of healthy and diseased animals which come to slaughter, A. HORN (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 6, pp. 424–437; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 8–9, pp. 247, 248*).—This work shows that the muscles of healthy, recently slaughtered animals can contain bacteria, but they are as a rule present in only very small amounts and can in most instances be detected only by enriching methods. The bacterial content of the muscles of diseased animals stands in no relation to the extent of the disease. The author recommends examining the spleen of animals affected with septicemic diseases.

The spontaneous occurrence of Bacillus enteritidis (Gärtner) in mice, and the significance of the meat-feeding test with white mice, G. F. BERG (*Über spontanes Vorkommen von Enteritidis-Gärtner-Bazillen bei Mäusen und die Bedeutung des Fleischfütterungsversuches an Weisse Mäuse. Inaug. Diss., Giessen, 1910, pp. 30; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 8–9, pp. 248, 249*).—Mice, according to this author, when inoculated intraperitoneally and subcutaneously with *B. enteritidis* (Gärtner), are killed, but when fed per mouth remain alive. When sound meat was fed the animals died in the same space of time as others which were fed diseased meat.

In regard to the occurrence of micro-organisms in the conjunctival sac of horses and bovines, F. KARSTEN (*Über das Vorkommen von Mikroorganismen im Konjunktivalsacke des Pferdes und Rindes. Inaug. Diss., Univ. Giessen, 1910, pp. 53, pls. 3; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 5, pp. 135, 136*).—The conjunctival sac of the horse and bovine almost always contains micro-organisms, which are variable in number. The white micrococci and the xerosis bacillus are almost invariably present, the former in greater amount. *Bacillus subtilis, Micrococcus aureus, Bacterium pseudoconjunctivitidis, M. roseus, M. sulfureus, M. aurantiacus, M. flavus, Streptococcus lanceolatus,* and *Bacterium pyocyaneum* are present occasionally.

Sacculated kidney, perinephritis and intranephritis, subcapsular cysts in domesticated animals, F. W. HAGEMANN (*Arch. Path. Anat. u. Physiol. [Virchow], 202 (1910), No. 2, pp. 244–266, figs. 8*).—The author describes the patho-anatomical and histological findings of the above conditions in bovines (including calves), hogs, and horses.

Contribution to the pathological anatomy of symptomatic anthrax, J. KATONA (*Állatorvosi Lapok, 33 (1910), No. 5, pp. 52, 53; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 3, p. 47*).—In 0.9 per cent of the cases the spleen was found to be enlarged and pasty. Furthermore, the pericardium was filled with a yellowish red, turbid, often fibrinous fluid. Both lamellæ of the sac were covered with small punctate hemorrhages. These pathological conditions often occur in symptomatic anthrax, and, therefore, the above factors must be considered when making a differential diagnosis between symptomatic anthrax and anthrax. Anthrax bacilli were never present in any of the cases examined.

Anthrax in hogs, A. HORN (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 5–6, pp. 458–464; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 19, pp. 347, 348*).—Three cases of anthrax in hogs are described. In one case the animal was affected with pharyngeal anthrax, and in the other two (probably) with intestinal anthrax.

In regard to human and avian diphtheria, RAPPIN and A. VANNEY (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 5, pp. 162, 163*).—The author studied the organisms obtained during an epizootic of avian diphtheria. The bacterium (and the toxin therefrom) closely simulated the bacillus of Lœffler.

Malleins and mallein, N. RUUSS (*Vet. Vrach, 1910, No. 40; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, p. 892*).—The author considers mallein a reliable diagnostic agent for glanders, and finds when using it subcutaneously or conjunctively that where a positive reaction is obtained it is an absolute indication of the presence of glanders.

Parasites of equine piroplasmosis, or biliary fever, G. H. F. NUTTALL and C. STRICKLAND (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 5–6, pp. 524, 525*).—The authors find that in addition to *Nuttallia equi* a second parasite occurs in equines to which the name *Piroplasma caballi* is given, and that each produces a specific disease. Both of these parasites are transmitted by ticks to horses, mules, and donkeys and are found in their blood for a long time after recovery from the disease.

Local reaction in antirabic inoculations, A. M. STIMSON (*Jour. Med. Research, 23 (1910), No. 3, pp. 511–515, figs. 2; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 10, pp. 955, 956*).—As a result of antirabic vaccination the area of injection often became red and odematous and caused considerable pain and itching. The lymphatic glands in the respirative region were enlarged. This reaction, which occurs in more than half of the cases, was more frequent in men than in women, in adults than in children, and in well-nourished than in poorly-nourished subjects; it was not due to bacterial infections.

In regard to some of the characteristics of Streptococcus equi, ALBRECHT (*Ztschr. Veterinärk., 22 (1910), No. 10, pp. 441–449; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 5, p. 132*).—A description of some of the biological and morphological characters of this organism. When the abscesses of the laryngeal lymphatic glands were opened sterilely, the organisms were found to be present in pure culture.

Studies in regard to the fixation of tetanus antitoxin by leucocytes, M. A. PETTERSSON (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8 (1911), No. 4, pp. 498–507*).—The polymorphonuclear leucocytes of the guinea pig, fowl, and rabbit are not capable either in the animal body or in the test tube of binding tetanus antitoxin; this also holds good for the lymphocytes in the thymus of the guinea pig, calf, and rabbit. Rabbit macrophages, on the other hand, possess a slight binding power.

Leucocytes, according to these findings, can not be considered a great factor for rendering this toxin innocuous in acquired and natural immunity.

Valuation of tetanus serum by the mixing and curative tests, J. ROSENBERG (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8 (1910), No. 3, pp. 379–396*).—The author believes the simplest method for the valuation of tetanus serum to be, for the present at least, the mixing test.

The relative importance of human and bovine tubercle bacilli to infection in man, A. CALMETTE (*Bul. Inst. Pasteur, 9 (1911), No. 3, pp. 97–105*).—This is a retrospect of the more important work done in this regard.

The question of tuberculosis infection of man by the bovine type of bacillus (perlsucht), B. MÖLLERS (*Deut. Med. Wchnschr., 36 (1910), No. 5, pp. 204–207; abs. in Hyg. Rundschau, 20 (1910), No. 21, pp. 1171, 1172*).—This is a critical discussion in regard to the present status of this problem.

A histological study of the lesions produced experimentally with homogenous cultures of Koch's tubercle bacillus in mammals, birds, and cold-blooded vertebrates, F. ARLOING and P. STAZZI (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 17, pp. 813–815; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1910), No. 2, pp. 68, 69*).—A detailed description of the micro-anatomical changes produced by the tubercle bacillus in the above-named animals.

Avian tuberculosis and its relation to tuberculosis in mammals, S. ARLOING (*Rev. Tuberculose, 2. ser., 7 (1910), No. 4, pp. 257–283, figs. 4; abs. in Ztschr. Tuberkulose, 17 (1911), No. 3, pp. 301, 302*).—Tuberculosis in fowls and other birds, according to the author, can not be considered an entirely different disease from the form which occurs in mammals. The causative organism is simply an atypical form of the Koch tubercle bacillus, and while it possesses some of the characters which are common to that bacillus, it has some which are inconstant and unusual. Like the human and bovine type it has undergone changes and can infect the mammalia, and vice versa the human and bovine types will affect birds. In view of this fact, the author points out the necessity of employing precautionary measures.

In regard to the frequency of tuberculosis in calves and adult bovines, H. MARKUS (*Tidjschr. Veeartscnijk., 37 (1910), No. 12, pp. 386–392; abs. in Ann. Méd. Vét., 60 (1911), No. 1, pp. 28–30*).—The figures given were obtained in an abattoir in Groningen, Holland, and are said to about represent the average findings. They are as follows: Adult bovines, 13.34 per cent; fat calves, 0.33 per cent; pastured calves, 3.63 per cent; calves, not very young, 0.10 per cent; pigs, 11.86 per cent; horses, 0.44 per cent; sheep and goats, 0 per cent.

The results show that the greatest percentage of tuberculosis exists in adult bovines and pigs.

The predisposing causes of tuberculosis in bovines, C. GUÉRIN (*Rev. Hyg. et Pol. Sanit., 32 (1910), No. 10, pp. 1015–1029*).—A discussion in regard to the prevalence of tuberculosis in bovines of various breeds, with particular reference to the color of these animals.

What is the common method of infection in tuberculosis? J. M'FADYEAN (*Jour. Compar. Path. and Ther., 23 (1910), Nos. 3, pp. 239–250; 4, pp. 289–303*).—"The inhalation of tubercle bacilli suspended in the atmosphere is a very certain method of infection in susceptible animals even when small doses of bacilli are employed. Experimental infection with tubercle bacilli by way of the alimentary canal is comparatively difficult to realize even in highly susceptible animals, and success is certain only when very large doses of bacilli are administered. With few exceptions, in animals experimentally infected with tuberculosis by way of the intestine the primary lesions are intra-abdomi-

nal, and the intrathoracic lesions when present are secondary. Inhalation is probably the commonest natural method of infection in those species (man and cattle) in which the primary lesions of tuberculosis are usually intrathoracic. Naturally-contracted cases of tuberculosis in man and other mammals can be ascribed to infection by ingestion only when the lesions revealed at the post-mortem examination are confined to the abdomen, or when the existing abdominal lesions are recognizably older than those present elsewhere in the body."

The inhalation of infinitesimal amounts of tuberculous material by bovines and its relation to the production of primary thoracic tuberculosis, P. CHAUSSÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *151* (*1910*), *No. 22, pp. 1009–1011*).—The inhalation of very small amounts of powdered tubercle bacilli suspended in water produced marked cases of thoracic tuberculosis.

The relation of fibrosis to tuberculosis, C. T. WILLIAMS (*Lancet* [*London*], *1910, I, No. 23, pp. 1521–1524, figs. 2; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5* (*1911*), *No. 3, p. 122*).—There are at least 3 different kinds of fibrosis of the lungs. One is the result of pleurisy; this is coarser and more vascular, and gives rise to interlobular bands which tend to compress the lung. Another is the result of interstitial pneumonia, specially frequent in those who pursue dusty occupations, also tending to contract the lung and to dilate the bronchi. The third form is . . . tersely described as the past tense of tubercle, fibroid tissue encircling caseous masses and old cavities and cutting off blood supply. The author describes the clinical features, which in the first two varieties are the direct consequences of a contracting lung. In the third form there is usually an increase in dyspnœa but an improvement in health in all other respects. An extreme case is described in detail.

A rare find in meat inspection, MATSCHKE (*Ztschr. Fleisch. u. Milchhyg., 20* (*1910*), *No. 9, pp. 297, 298; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5* (*1911*), *No. 5, p. 234*).—An apparently sound cow which had dyspnœa on autopsy was found to have laryngeal tuberculosis. The tuberculous focus was of the size of a walnut, but uneven in shape.

The author also noted a 14-day-old calf which was well nourished but tuberculous.

Tuberculosis of the larnyx in a cow, E. W. HOARE (*Vet. Jour., 67* (*1911*), *No. 429, pp. 171, 172*).—This is a description of a case of tuberculosis of the larynx in a cow, and includes the symptomatology and pathology.

Contribution to our knowledge of tuberculosis in the goat, P. FROSCH and K. HERTHA (*Beitrag zur Kenntnis der Ziegentuberkulose. Inaug. Diss., Univ. Bern, 1909, pp. 32; Ztschr. Infektionskrank. u. Hyg. Haustiere, 8* (*1910*), *No. 1, pp. 63–90; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5* (*1911*), *No. 5, p. 235*).—After reviewing the statistics and the various beliefs of the public in regard to the transmissibility of tuberculosis from the goat by way of the milk, etc., to man, the authors give their results with 8 cases which came up for pathological examination, 6 of which did not show any evidence of tubercle bacilli.

Animal experiments showed that the 6 cases were tuberculous and infected with the bovine type of bacillus. The patho-anatomical findings, however, varied from the bovine form of tuberculosis in so far that they showed nodules in the various organs which had a great resemblance to echinococcus cysts. These cysts contained a pasty, greenish mass which could be stripped from the capsule very easily. Histologically the nodules showed centrally detritus, and peripherally giant-round and epithelioid cells. The most external stratum consisted of spindle cells.

Tuberculosis is thought to occur more frequently in goats than in sheep, but less frequently than in the bovine or hog.

Tuberculosis and the tuberculin reaction, RÖMER and JOSEPH (*Beitr. Klinik. Tuberkulose, 17 (1910), No. 3, pp. 427–460, pls. 8; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 8, p. 858*).—For the bovine, the intra- and subcutaneous tuberculin tests are almost absolutely reliable. The intracutaneous test is deemed the only reliable reaction for hogs and guinea pigs. The author recommends the puncture and the intracutaneous reactions for man.

In regard to the thermal tuberculin reaction in bovines, E. HAUPTMANN (*Tierärztl. Zentbl., 33 (1910), Nos. 9, pp. 133–139; 10, pp. 150–158; 11, pp. 170–175; 12, pp. 181–186; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 10, p. 181*).—This is a study of the effect of repeated injections of tuberculin upon the diagnostic value of the tuberculin reaction. The author points out, among other things, that the rule set up by Koch in regard to the interpretation of the tuberculin reaction is of value for bovines only when long intervals elapse between the injections.

The effect of the injection of the various tuberculins and of tubercle endotoxin on the opsonizing action of the serum of healthy rabbits, R. T. HEWLETT (*Proc. Roy. Soc. Med. [London], 3 (1910), Nos. 6, pp. 165–168; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1910), No. 1, p. 25*).—This work shows that old tuberculin had practically no effect on the opsonins in healthy rabbits, while the tubercle endotoxin (prepared by trituration from a culture of human tubercle bacilli, filtration, and standardization) produced a more marked stimulus on the opsonizing activity than either tuberculin I. K. or tubercle bacillary emulsion. The author suggests that this may be a more active therapeutic agent than either old tuberculin, tuberculin T. R., or bacillary emulsion.

In regard to tuberculins which have the poisonous principle removed, A. WOLFF-EISNER (*Berlin. Klin. Wchnschr., 47 (1910), Nos. 47, pp. 2147–2150; 48, pp. 2200–2202; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 10, p. 948*).—This is a critical discussion and report of some investigations in regard to 2 new tuberculin preparations (Höchst's new tuberculin, and Endotin). Both gave results which were comparable to the usual tuberculin reactions.

The detection of tuberculosis with Bovotuberculol, KRANICH (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 19, pp. 341–344*).—If the specifications are adhered to, the ophthalmo-reaction with Bovotuberculol is a more convenient and reliable method than the subcutaneous injection of tuberculin.

The technique of determining the opsonic index, H. REITER (*Deut. Med. Wchnschr., 36 (1910), No. 52, pp. 2426–2428; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 11, p. 995*).—This is an exact and detailed discussion of the methods and principles involved for determining the opsonic index.

Practical results with the intracutaneous tuberculin reaction with hogs and bovines, G. MARTIN (*Beitr. Klinik Tuberkulose, 16 (1910), No. 1, pp. 37–54; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 5, p. 240*).—The author recommends this reaction for general veterinary practice.

In regard to the clinical utility and the nature of the complement fixation reaction according to Marmorek, D. KLINKERT (*Ztschr. Expt. Path. u. Ther., 8 (1910), No. 2, pp. 451–464*).—Marmorek modified the complement fixation method in so far that with it it was possible to diagnose tuberculosis with the urine or blood from a tuberculous subject. The author investigated the value of the test with 600 subjects (306 serum and 294 urine), and from the work he concludes that Marmorek's reaction is a good scientific method for

the diagnosis of tuberculosis, but that the results obtained with it are not specific enough.

The meiostagmin reaction in experimental tuberculosis, A. GASIHARRINI (*München. Med. Wchnschr., 57 (1910), No. 32, p. 1688*).—The meiostagmin reaction according to the author can be employed for the differentiation of tuberculosis caused by the bovine or human type of bacillus.

Experimental studies in tuberculosis, RÖMER and JOSEPH (*Beitr. Klinik. Tuberkulose, 17 (1910), No. 3, pp. 281–285, fig. 1; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 8, pp. 856, 857*).—A reinfection with the tubercle bacillus could not be produced by cutaneously injecting 0.000,001 mg. of bacillus emulsion if the animals in question were injected subcutaneously from 2 to 14 months previous to the second injection and were allowed to acquire a slowly progressing tuberculosis. Intracutaneous doses less than 0.000,001 mg. were also ineffective.

For refuting some of Joest's findings (E. S. R., 23, p. 687) the authors extirpated a tuberculous lymphatic gland from a guinea pig, made it into an emulsion with physiological salt solution, and injected it intracutaneously into the same guinea pig. This animal could not be infected the second time. A control pig inoculated at the same time succumbed to the disease.

Other tests continued along the same lines showed somewhat similar results.

Prophylactic vaccination against tuberculosis, MAEFFSKIJ (*Arch. Vet. Nauk. [St. Petersb.], 40 (1910), No. 4, pp. 411–423; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, pp. 906, 907*).—The author points out that calves do not, as is generally assumed, act indifferently toward the Koch-Schütz Tauruman vaccine; instead, 15.36 per cent of the animals became sick after the vaccination. Tauruman vaccination for calves affected with tuberuclosis has a tendency to hasten the course of the disease, and not seldom (3.6 per cent of the cases) does it cause death. The duration of immunity with this vaccine is limited, and usually lasts only one year.

Combating tuberculosis in hogs, A. EBER (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 10, pp. 321–326; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 5, p. 251*).—A general discussion in regard to the occurrence of this disease in hogs, and the relation which the feeding of skim milk has to it.

The author does not believe that centrifuging the milk will make it more sanitary for this purpose.

Contribution in regard to the nature of tuberculosis-immunity-antibody studies, RÖMER and JOSEPH (*Beitr. Klinik Tuberkulose, 17 (1910), No. 3, pp. 365–382; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 8, pp. 854, 855*).—For these tests the author utilized sheep which had been repeatedly tested in regard to their active immunity.

From the results it may be noted that immunity against tuberculosis may exist in the absence of agglutinins in the blood; complement deviating substances were not present in every case, and bacteriotropins were not looked for. Anticutins were looked for in the serum of immune guinea pigs by mixing tuberculin with the serum of immune guinea pigs and injecting this intracutaneously into guinea pigs. The results were negative.

Bactericidal and anti-infectious substances were not found in sheeps' blood; the serum of immune sheep never conferred immunity upon normal guinea pigs.

Studies in immunity to tuberculosis.—Hypersensitiveness to tuberculoprotein and its relation to some tuberculosis problems, A. K. KRAUSE (*Jour. Med. Research, 24 (1911), No. 2, pp. 361–409, tables 3*).—"This inquiry resolved

itself into three main parts: First, the working out of some details of acquired sensitiveness to tuberculo-protein; second, an investigation of the possibility of rendering nontuberculous guinea pigs tolerant to the protein; third, a study of the course of experimental tuberculosis in sensitized guinea pigs as compared with that in nonsensitized animals." Particular attention was given to solving some problems in relation to the tuberculin reaction, the symptomology of tuberculosis, the possibility of overcoming the hypersensitiveness to tuberculo-protein and the prudence of doing so, susceptibility to infection, etc.

As a result of the work the author concludes that "sensitization of nontuberculous guinea pigs with tuberculo-protein does not alter their resistance to experimental tuberculous infection, that sensitization to tuberculo-protein and relative immunity (increased resistance) to infection can occur coincidently in the same animals, and that resistance to infection is markedly lowered during the period that a sensitized animal is suffering from symptoms of anaphylactic shock."

The inheritance of tuberculo-protein hypersensitiveness in guinea pigs, A. K. KRAUSE (*Jour. Med. Research, 24 (1911), No. 3, pp. 469–482*).—This work, according to the author, confirms all the conclusions drawn by Lewis[1] (who experimented with horse serum), and it also re-illustrates the correspondence of tuberculo-hypersensitiveness with other forms of hypersensitiveness.

The results are summarized as follows: "Tuberculo-protein hypersensitiveness can be inherited from a sensitive, nontuberculous mother (thus confirming Baldwin). The possibility of its inheritance is more or less irregular and inconstant. It depends largely on the degree of sensitiveness of the mother at the time of pregnancy. The degree of sensitiveness of the offspring as a rule varies directly with that of the mother. The mother's sensitiveness is heightened by repeated applications of antigen, and, conversely, tends to die out with time unless renewed by subsequent injections. The degree of senstiveness of the offspring accordingly varies, depending on the time that has elapsed between the mother's last dose and the former's birth. The degree of sensitiveness that an animal inherits tends to diminish as it increases in age and size. Animals of the same litter may vary greatly in the degree of sensitiveness which they inherit. Congenitally sensitive animals may, however, maintain their anaphylactic state for a very long time. One was still sensitive 404 days after birth, and several when over 100 days old. Transmission by inheritance is probably always or mainly one of antibodies. Hypersensitiveness is probably never handed down to the third generation."

Nontubercular mortality among guinea pigs, R. A. O'BRIEN (*Jour. Meat and Milk Hyg., 1 (1911), No. 6, pp. 295–314, charts 2*).—"The object of the investigation was to determine the cause of the 'nontubercular mortality' amongst guinea pigs and any bearing this might have on the general question of the purity of London milk. By 'nontubercular mortality' [the author means] the mortality from causes other than tuberculosis amongst guinea pigs injected with the sediment from samples of milk.

"A part of this 'nontubercular mortality' was due to infectious diseases which the animals were incubating at the time they were inoculated with the milk sediments, or with which they became infected during the month they were allowed to survive prior to examination for tuberculosis. This was notably the case during November and December, 1909.

"Infection by bacilli identical with those derived from the feces of cows and other animals contained in the milk inoculated is responsible for a certain amount of the 'nontubercular mortality,' this amount being impossible to determine accurately.

[1] Jour. Expt. Med., 10 (1908), No. 1, pp. 1–29.

"The greater part of the mortality, however, appears to be occasioned by a combination of factors. A disturbance to the animal's economy is occasioned by the considerable dose of bacterial protein in the sediment, quite apart from the capacity of such bacteria to survive in the tissues. This may so lower the resistance of the animal that it succumbs either to an aggravation of an existing but hitherto indolent infection—e. g., pseudo-tubercle—or to the invasion of the organism by bacilli present in its intestine.

"No evidence was obtained of the presence in the milk of bacilli causing common diseases in man, such as typhoid fever, diphtheria, dysentery, or 'food poisoning.'"

Eradication of cattle ticks in Alabama, James Wilson (*U. S. Senate, 62. Cong., 1. Sess., Doc. 47, 1911, pp. 5*).—A detailed statement of the tick eradication work in Alabama, transmitted in response to a Senate resolution of May 11, 1911.

Onchocerca gibsoni: The cause of worm nodules in Australian cattle, J. A. Gilruth and Georgina Sweet (*Sydney: Gort., 1911, pp. VIII+34, pls. 17*).—This is the report of a study of the distribution, situation, structure, pathological effects, and, to some extent, the life history of the parasite *O. gibsoni*, the cause of what is known by such terms as "worm nodules," "worm nests," "kernels," etc., within the briskets and thighs of cattle in certain parts of Australia.

In regard to operating on teat strictures, Kregenow (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 48, p. 939*).—The author operated on 40 cases of stricture of the teat, utilizing the classical dilation method in conjunction with cutting by Steffen's stricture knife. All operations were successful, with the exception of 2 which went over to mastitis.

A new intestinal astringent and disinfectant (Tanargentan) for treating scours in calves, M. Mandelbaum (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 44, pp. 845, 846*).—The results of the treatment, with this preparation, of nearly 1,000 calves affected with scours were satisfactory.

Actively immunizing the goat against Malta fever, H. Vincent and Collignon (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 34, pp. 468–470; abs. in Rev. Vét. [Toulouse], 36 (1911), No. 2, pp. 101, 102*).—For immunizing the goat against Malta fever the author injected emulsions of gelatin cultures of *Micrococcus melitensis* in physiological salt solution subcutaneously and intravenously. After a while the 2 groups of animals each received intravenous injections of 4 cc. of virulent cultures of *M. melitensis*.

The first group (subcutaneous) showed no abnormal symptoms after 6 months, and at the time of writing were in perfect health, with the exception that their serum possessed a strong agglutinating power. The other lot were febrile, had diarrhea and a lack of appetite, and were a little thinner. A triple subcutaneous injection of the culture seemed to be the most efficacious method of immunizing them.

New findings with hog cholera, Gildemeister (*Deut. Mil. Ärztl. Ztschr., 39 (1910), No. 24, Vereinsbeilage, p. 27; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 10, p. 955*).—It was always possible to detect cellular inclosures in the epithelial cells of the conjunctivas of pigs suffering from hog cholera and which simulated trachoma. Among the 60 animals which were examined, one which was apparently clinically sound and had no indications of irritation in the conjunctiva also showed these cellular defects. Furthermore, these trachoma-like bodies were found in from 6 to 16 shoats which came from questionable stalls.

Although these formations are present in almost all cases of hog cholera, the author was not prepared to declare their significance.

Various remarks in regard to hog cholera, GRAFFUNDER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 47, pp. 913–916*).—A detailed and critical discussion of the etiology, pathology, symptomatology, diagnosis, and treatment of hog cholera.

Do hog-cholera bacilli occur in the intestines of healthy hogs? L. J. H. STADHOUDER (*Beiträge betreffend die Frage, ob Schweinepestbazillen in den Gedärmen gesunder Schweine vorkommen? Inaug. Diss., Univ. Bern, 1910, pp. 55; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 49 (1911), No. 5, p. 141*).—The author investigated the question whether hog cholera is caused by a filterable, ultravisible virus or a bacillus which is a normal inhabitant of the intestinal tract of hogs. Hog-cholera bacilli could not be found in 25 Holland hogs which came to slaughter. By subcutaneously inserting small plugs of cotton containing the hog-cholera bacillus behind the ear of young pigs a pathological condition could be produced which could not be differentiated from hog cholera.

The author, however, does not believe it proper to consider the avirulent bacilli found in the intestinal tract of hogs the causative agent of hog cholera.

In regard to the immunity of rabbits against Bacillus suipesticus, J. SHOUKÉVITCH (*Ann. Inst. Pasteur, 24 (1910), No. 9, pp. 728–747*).—Rabbits which were repeatedly injected with killed cultures of *B. suipesticus* (*B. suipestifer*, hog cholera) showed no increased resistance against infection. On the other hand, their sera had an increased agglutinative power, opsonic index, and complement deviation.

Pretreating the animals subcutaneously with living bacteria in minimum and large doses showed increased resistance in about 1 or 2 weeks. After a long time these rabbits became paralyzed and died, but the deaths could never be traced to a septicemia. The author surmises that the mortality was due to a chronic intoxication, the toxins originating from some bacterial focus. According to this the animals acquired an anti-infective immunity, but not an antitoxic immunity. The sera of such animals on the average showed a much smaller amount of opsinins, agglutinins, and complement-fixing bodies than the sera of animals treated with dead bacteria.

In regard to Krafft's vaccine against swine plague, A. SCHULTZE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 44, pp. 843–845*).—In the hands of this author Krafft's vaccine was without value. On the contrary, it seemed detrimental.

Krafft's vaccine against swine plague, KRAFFT (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 48, pp. 940, 941*).—A description of the pathological findings, and a reply to the abstract above.

Contribution to our knowledge in regard to hog erysipelas, E. NATUSCH (*Beiträge zur Kenntnis des Schweinerotlaufs. 1. Übertragbarkeit des Schweinerotlaufs auf den Menschen. 2. Bildet der Bacillus rhusiopathiæ suis Toxine? Inaug. Diss., Giessen, 1910; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 49 (1911), No. 5, pp. 137, 138*).—In the first part of this article the author discusses the possibility of communicating hog erysipelas to man, and presents his positive conclusion. The second part deals with the question as to whether *B. rhusiopathiæ suis* produces toxins.

The author inoculated filtrates from cultures of this bacillus into mice, but no death or toxicosis was produced. If, however, 1 to 2-day bouillon culture filtrates were concentrated in a vacuum apparatus to volumes corresponding to 1/3, 1/5, and 1/17 of the original volume, they produced when inoculated intraperitoneally or subcutaneously a toxic condition which, in most instances, terminated in death. Sterile bouillon concentrated and injected in the same manner produced no symptoms.

From this the author concludes that *B. erysipelatis suis* produces a toxin.

The influence of a mixed and secondary infection upon Bacillus erysipelatis and hog erysipelas immunity, H. FALK (*Centbl. Bakt. [etc.], 1. Abt., Orig., 55 (1910), No. 6, pp. 464–487; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 5, p. 138*).—As with other organisms, *B. erysipelatis suis* after cultivating for a long time in culture media loses its virulence. By cultivating the hog erysipelas bacillus, *B. coli*, *B. paratyphosus*, *B. suipestifer*, and *B. suisepticus* in bouillon the author was able to note that an increase in virulence was obtained. Animals injected with the symbiotic cultures succumbed much more rapidly than those injected with cultures which had been cultivated separately and injected simultaneously. Mice which were immunized passively with hog erysipelas serum were able to stand infection with *B. erysipelatis suis* better than mice which were infected with mixed cultures. Rabbits immunized with increasing amounts of the hog erysipelas bacillus gave an immune serum of higher potency than those immunized with symbiotic cultures.

The results in regard to vaccination against equine influenza with Lorenz's vaccine, RUGGE (*Ztschr. Veterinärk., 22 (1910), No. 11, p. 510; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 8, p. 844*).—The results with this serum in cases of equine pneumonia were not favorable.

The merits of Williams' operation for roaring, F. HOBDAY (*Vet. Jour., 67 (1911), No. 436, pp. 621–628*).—A paper read before the American Veterinary Association, August 24, 1911.

The surgical relief of roaring, W. L. WILLIAMS (*Vet. Jour., 67 (1911), No. 436, pp. 605–621*).—A paper read before the American Veterinary Association, August 24, 1911. A bibliography is included.

An investigation as to the occurrence in Massachusetts of paralysis in the lower animals and fowls, A. W. MAY (*Mo. Bul. Bd. Health Mass., n. ser., 6 (1911), No. 6, pp. 178–184*).—This is a report of an investigation made under the direction of the state board of health to determine, in a general way, the frequency of paralysis in the lower animals. The investigation extended from October 15 to December 31, 1910, and consisted mainly of interviews with veterinarians, poultry raisers, and dog breeders. The area covered included the whole of Berkshire, Middlesex, and Essex counties and parts of Franklin, Worcester, Norfolk, Suffolk, and Plymouth counties. The 30 cases reported include equines, bovines, pigs, dogs, cats, and chickens.

A biological study of 11 pathogenic organisms from cholera-like diseases in domestic fowls, P. B. HADLEY and ELIZABETH E. AMISON (*Rhode Island Sta. Bul. 146, pp. 43–102*).—This is a biological study of 11 cultures of bacteria which were isolated from poultry during an epizootic of a cholera-like disease which occurred in Rhode Island and in the neighboring States. The purpose of the work described in this bulletin, according to the authors, was to establish a secure basis for determining proper prophylactic and therapeutic measures against this disease.

The results of the investigations show that "genuine fowl cholera (identical with that studied by Pasteur and Toussaint) is endemic in the New England States, and probably through the Middle West. Its prevalence is increasing.

"There exist, however, other diseases resembling fowl cholera, in which the cholera organism is absent. The organisms causing these diseases usually belong in the para-colon, para-typhoid, or influenza group, and are to be sharply distinguished from the genuine fowl cholera organism, *Bacterium bipolaris septicus*. With one exception, all the organisms derived from cholera-like epidemics in Rhode Island, Massachusetts, and Connecticut proved to be identical with *B. bipolaris septicus*, which is common throughout Europe, and there produces annually great losses to the poultry industry. Ten strains of this

organism coming from widely distributed sources were studied in the present investigations. . . .

"The virulence of the cultures studied was characterized by great variation. The range of the minimum lethal dose of a 48-hour bouillon culture was for fowls from 10 cc. to 0.000,000,000,000,001 cc., and for rabbits, from 10 cc. to 0.000,000,000,000,000,000,01 cc."

It was also noted that "infection resulted from the inoculation into the breast muscle of less than 50 organisms, and probably by the inoculation of no more than 4. [This] suggests an immediate paralysis of the phagocytic function in infected birds, and offers an explanation for the great infectivity of the disease among poultry under natural conditions."

The cultural investigations of this cholera organism indicate that: "(a) The cause of fowl cholera, as encountered, is not a polymorphic organism in the same sense that *B. diphtheriæ* is a polymorphic organism. (b) There is no good ground, in the case of the cultures studied, to separate a group of pseudo-cholera organisms, on the basis of morphology, virulence, or any cultural feature; all belong in one large group in which there is great variability with regard to these 3, as well as many other, points. (c) There appear to exist correlations between virulence and certain cultural features, such as indol-production, acid-formation, nitrate reduction, etc. But this point should be further established by the study of a great number of cultures. (d) In view of the points brought out in (a) and (b) above, the presence of any organism manifesting the type features of the cholera group, notwithstanding the absence of pathogenesis, should be regarded with suspicion. (e) The slight resistance of the virulent cholera cultures to carbolic acid, and to all acid media or solutions tried, offers a suggestion as to therapeutic possibilities. Studies involving this feature are now in progress.

"Immunological studies, so far as they have been extended up to the present date, indicate that a highly virulent culture encounters resistance in a susceptible animal when this animal has been previously inoculated with an avirulent, homologous culture; resistance, in rabbits, to 10,000,000,000 times the minimum lethal dose of a very virulent culture has been artificially produced by a single large dose (3 cc.) of the homologous culture. None other than homologous cultures produced such resistance in rabbits."

"The resistance of the cholera organisms to heat, drying, carbolic acid and hydrochloric acid was also tested."

Further studies on blackhead in turkeys, P. B. Hadley and Elizabeth E. Amison (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 58 (1911), No. 1, pp. 34–41*).—The authors state that during the course of investigations conducted in continuation of those previously noted (E. S. R., 24, p. 187), cases of cecal and liver infection in which coccidia appeared to be absent or present only in small numbers have come under observation. In these instances flagellated organisms were frequently present in the intestinal and cecal content in great numbers. The results of examinations made of cecal contents and of sections are described and the possible agency of flagellates in producing hepatic and intestinal lesions that are characteristic of blackhead briefly discussed.

They conclude that "the data presented in this paper offer reliable grounds for the opinion that many cases of blackhead in turkeys and other poultry may be interpreted as infections with one or more species of flagellated organisms. These may be identical with the flagellates observed by Theobald Smith in the ceca of turkeys; they are undoubtedly identical with some of the other bodies described by Smith under the name of *Amœba meleagridis*. . . . The course of development probably does not depart widely from that of certain other parasitic flagellates which have the habit of losing their flagella and becoming ameboid at certain stages in their development."

Studies in avian coccidiosis.—III, Coccidiosis in the English sparrow and other wild birds, P. B. HADLEY (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 5–6, pp. 522, 523*).—In connection with the investigations previously noted (E. S. R., 24, p. 187) dealing with the etiology of blackhead in turkeys several species of wild and domestic birds were examined for the coccidium.

The common occurrence of the coccidium in the intestinal tract of the common English sparrow was especially noteworthy. Of 72 English sparrows examined, 47 contained coccidia, although in many cases the birds were apparently in good physical condition. The seasonal distribution of coccidiosis among sparrows was found to correspond with that of domestic poultry.

"The coccidia when present were always found in the small intestine. They were frequently met with in small numbers, when their presence did not appear to be accompanied by any macroscopical pathological appearance. In other cases, however, either the whole or small segments of the small intestines were highly inflamed, and the contents blood-stained, showing that there existed hemorrhages in the mucosa. In these cases, the number of coccidia was usually considerable, and microscopical examination revealed the presence of large numbers of desquamated epithelial cells lying free in the intestinal content. The walls of the intestines were not found thickened to any great degree, and other organs were apparently never affected. The liver, which is the frequent seat of coccidial lesions, both in mammals and in birds, was always normal.

"A study of the morphology of the coccidium of the sparrow demonstrated that it was identical with coccidium of blackhead in turkeys, and of coccidial white diarrhea of chicks. . . . In order to establish the pathogenicity of the coccidia from the sparrow for domestic poultry, cyst-containing material from the intestines of sparrows apparently suffering from the disease was fed to young chicks, with the result that coccidiosis appeared. In a similar manner cyst-containing material from poultry was fed to caged sparrows, several of which subsequently developed coccidiosis after an incubation period of about 13 days.

"Further examinations showed that the parasites were often present in the field sparrow (*Spizella pusilla*), a white throated sparrow (*Zonotrichia albicollis*), junco (*Junco hyemalis*), hermit thrush (*Turdus aonalaschkæ pallasii*), and robin (*Merula migratoria*). They were of common occurrence in both quail (*Colinus virginianus*) and grouse (*Bonaso umbellus*), and in these birds a severe coccidiosis was often present, especially in birds in the vicinity of a poultry plant. It is believed that certain epidemics among both quail and grouse in the United States may be due to coccidiosis."

Coccidiosis was also observed in the partridge woodpecker (*Colaptes auratus luteus*). The author states that what is thought to be the merozoite or sporozoite stage of the coccidium has been observed in the blood of English sparrows by F. G. Novy of the University of Michigan.

RURAL ENGINEERING.

Blowing stumps with dynamite, G. ROBERTS (*Kentucky Sta. Bul. 154, pp. 19–31, figs. 4*).—Directions for blowing stumps with dynamite are followed by statements of the results of tests of the efficiency and economy of this method. Fifty per cent dynamite was used in most of the work but 40 per cent proved satisfactory when used on some of the dead stumps.

Over 100 stumps having an average diameter of 16 in. were blown at London, Ky. The average number of sticks of dynamite used was 2.6, the average time required per stump 30 minutes, the average cost of material 25.7 cts. and the average total cost per stump 33 cts. Nearly all the stumps were dead oak.

At the experiment station farm at Lexington 9 green stumps averaging 22 in. in diameter were blown at an average cost of $1.56 per stump, 10⅓ sticks of dynamite per stump being used. Of these stumps 3 black oak averaged 45 in. in diameter and were blown at a total cost of $3.52 per stump, the average number of sticks of dynamite used being 23⅓.

The amount of dynamite required to blow stumps of the same kind in the same soil does not vary directly with the diameter, but more nearly with the square of the diameter, or in other words, with the area of a cross section of a stump.

Sanitary dairy barns, O. ERF (*Ohio State Univ. Bul., 14 (1910), No. 7, pp. 132–166, pls. 2, figs. 25*).—A lecture at the Cincinnati Milk Show and Dairy Institute held in May, 1909. The author discusses what constitutes a sanitary barn, the materials of which it should be built, and equipment for economizing labor and improving sanitary conditions. Several barn plans are illustrated and described.

A unique Mexican silo, O. ERF (*Hoard's Dairyman, 42 (1911), No. 43, p. 1321, figs. 3*).—A brief description of a silo 30 ft. in diameter and 70 ft. deep, which was dug on a hillside. A great variety of crops were grown to fill this silo, though the 2 principal crops were barley and oats. The silage is taken out through a tunnel projected into the hill.

Poultry house construction, J. G. HALPIN and C. A. OCOCK (*Wisconsin Sta. Bul. 215, pp. 3–32, figs. 23*).—This contains a discussion of the site for the poultry house, and details of construction, including types of roof, floor, walls, nests, dropping boards, and watering devices. Plans are given for a portable house for small lots, a brooding house, a breeding house, and a laying house.

Up-to-date poultry houses and appliances, edited by H. TRAFFORD (*Springfield, Ohio, 1911, pp. 112, figs. 86*).—A great variety of poultry houses, brooders, feeding troughs, drinking fountains, and other appliances are illustrated and described.

Naphthalene in road tars.—I, The effect of naphthalene upon the consistency of refined tars, P. HUBBARD and C. N. DRAPER (*U. S. Dept. Agr., Office Pub. Roads Circ. 96, pp. 12, figs. 2*).—As the degree of fluidity of a tar intended for road construction is of great importance, a study was made for the purpose of determining the relation of the naphthalene content of such materials to their consistency. The effect of naphthalene upon the consistency of water-tar pitch was also studied.

As the result of this work the authors point out that "while at the present time it does not seem advisable to draw very definite conclusions, the foregoing results nevertheless strongly indicate the following facts: (1) That the fluxing value of naphthalene for tar pitches is somewhat greater than, although quite similar to, the heavier naphthalene-free tar distillates, until the mixture becomes saturated with naphthalene; (2) that for the harder tar pitches the addition of very small percentages of naphthalene will produce a marked increase in fluidity of the resulting product; (3) that for the softer pitches the addition of naphthalene in small quantities causes less increase in fluidity than for the harder pitches; (4) that where naphthalene is added beyond the point of saturation a rapid decrease in the fluidity of tars at temperatures below the melting point of naphthalene is observed, but at temperatures above its melting point the fluidity continues to increase. . . . Within a reasonable degree of accuracy, it should be possible to foretell, by reference to the curves which [are] given, what consistency to expect from the addition of a given percentage of naphthalene to a tar pitch or refined tar of known consistency irrespective of the free carbon content of the tar."

White and color washing with native clays from Macon County, Alabama, G. W. CARVER (*Alabama Tuskegee Sta. Bul. 21, pp. 4*).—This bulletin points out that the white and colored native clays can be profitably used for white and color washing of the exterior and interior of buildings and gives directions for their use.

RURAL ECONOMICS.

Prosperous agriculture and home life, what it means to the nation, F. W. WATERIDGE (*London, 1911, pp. 263, pls. 16*).—In this book the author endeavors to arrive at the economic and social principles underlying a prosperous agriculture, giving considerable attention to the social aspects which he deems of much significance to a permanent prosperity in agricultural life.

[Agriculture in Bavaria], L. BUCHMANN (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1911, No. 4798, pp. 32–39*).—This report presents a summary of data on many phases of rural economy in Bavaria, some of which are noted below.

It is pointed out (1) that the percentage of persons employed in agricultural pursuits as compared with the total population has decreased from 50.9 per cent in 1882 to 40.3 per cent in 1910; (2) that of the 669,111 farms, three-fifths belong to the peasantry, the rest being owned by "gentlemen farmers;" that 407 of these holdings were compulsorily sold in 1910, the smallest number reported for the last 31 years, and (3) that the Bavarian government has given much attention to fruit growing, a decree having been issued as early as 1769 requiring all land owners to plant fruit trees along the public highways bordering their estates and the systematic planting of such trees having been begun about the middle of the last century. The value of fruit trees in Bavaria is now estimated at £35,000,000.

The agricultural and forest products of British West Africa, G. C. DUDGEON (*London, 1911, pp. X+170, pls. 17, fig. 1*).—This book presents a general account of the principal commercial resources of British West Africa. Descriptions are given of the occurrence, cultivation, and uses of such tropical materials as cotton and other fibers, cocoa, rubber, oil seeds, tobacco, etc. The different regions to which the book has special reference are the Gambia, Sierra Leone, the Gold Coast, Ashanti, and the northern territories, Southern Nigeria, and Northern Nigeria.

Four Brazilian States, J. POMPEU (*Rio de Janeiro, 1910, pp. XIX+50+79+54+52, pls. 59*).—This is a popular treatise on the commercial and agricultural industries of the States of Sao Paulo, Minas Geraes, Rio de Janiero, and Paraná. The text is in German and in English.

[Progress of agriculture], G. H. KNIBBS (*Off. Yearbook Aust., 4 (1901–1910), pp. 361–429*).—Notes and statistics are given showing early records and progress of agriculture in Australia, the relative importance of crops as regards area and population, and the yields, prices, imports, exports, value, etc. of various crops for a period of years.

Attention is directed to bounties granted to sugar growers by the Commonwealth, the object in view being that of assisting the industry while at the same time diminishing the employment of colored labor in connection therewith. The government paid in the way of bounties in this industry alone, £402,131 in the years 1909 and 1910. Fairly liberal bounties are also offered on other agricultural products, e. g., gin cotton; jute, flax, and hemp fibers; oil materials; unclean rice; raw coffee; leaf tobacco; and dried fruits, but the bounties have not been availed of to a great extent, a total of only £686 being paid on the above-named articles in 1909–10.

The agricultural laborer in London (*Agr. Econ., 4 (1911), No. 503, p. 288*).—It is pointed out in this article that a large number of agricultural

laborers are gradually drifting into London, and that many of them are being fed by the charity organizations, 200 being reported as having been fed in one night by a single organization. The author attributes the movement not to the increased wages they receive in the city but to the long dreary evenings in the villages where there are but few or no attractions for the farm laborer. Speaking further of the agricultural laborer, the article says "unfortunately he is a fish out of water in London, and soon joins the ranks of the Embankment loungers. Then when he does return, in many instances he has become unfitted for steady work."

Labor exchanges for English agriculturists, R. C. TREDWELL (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 273, p. 921*).—It is pointed out in this report that the labor exchange as now being developed in Great Britain is a national system of offices supported by the Government through which people who seek work and those seeking workers may be brought together. The exchange is being developed to serve not only the urban centers but also with special reference to agricultural districts. Further details of the project are shown in the report.

Annual report on the working of cooperative credit societies in the Bombay Presidency (including Sind), for the year 1909–10 (*Ann. Rpt. Work. Coop. Credit Soc. Bombay, 1909–10, pp. 58+2, pl. 1*).—This report presents a detailed account of the workings of the various cooperative credit societies in Bombay for 1910, showing that 40 new societies were formed, making a total of 208 of which 115 are rural, and with a total membership of 15,519.

The American cotton system, T. S. MILLER (*Austin, Tex., 1909, pp. XI+294, pls. 3*).—This book presents a historical treatment of the subject of cotton growing and marketing in the United States, describing the operations of the cotton exchange and cotton classification, explaining how the cotton crop finds a market, and illustrating some practical problems concerning the cotton grower, dealer, and exporter.

Crop production in the United States in 1910, N. KAUMANNS (*Mitt. Deut. Landw. Gesell., 26* (*1911*), *No. 29, pp. 404–408*).—Notes and data are here presented showing, among other things pertaining to agriculture, the yield per acre and total production of the leading crops in the United States in 1910.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13* (*1911*), *No. 11, pp. 81–88*).—This presents a general review of crop conditions in the United States and foreign countries, statistics as to the farm value of important products, wheat prices in England in six centuries, cost of producing potatoes in the United States, the hop movement in the United States 1902–1911, causes of crop damages in 1910 and 1909, and range of prices of agricultural products at important markets, temperature and precipitation data, monthly receipts of eggs and poultry, and a discussion of bushels of weight and bushels of volume.

Foreign crops, October, 1911, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 25, pp. 16*).—This circular presents statistics as to the condition of wheat, rye, barley, oats, maslin, and other crops in the various foreign countries, the exports of wheat and wheat flour from Russia by countries of destination, 1905–1910, and other data.

AGRICULTURAL EDUCATION.

Agriculture in the high school, J. MAIN (*Pop. Sci. Mo., 79* (*1911*), *No. 4, pp. 385–395*).—This article consists of a study of the purposes of agricultural instruction and, more especially, of its adjustment to other high school subjects. Although one of the strongest arguments for the introduction of agri-

culture in the schools has usually been its immense economic significance, the author believes that the successful teaching of agriculture in the schools, along with the traditional courses, depends, like all the rest, upon its being regarded and developed as a humanistic subject as well, and that it will have to "make good" pedagogically if it is to have a permanent place.

The close relation of the sciences to agriculture makes the problem of the adjustment of all a single problem, and the thesis here maintained is that the child's mind and body, rather than the materials, should be the controlling factors that determine all courses of study, and that in the high school these must first, in this case, determine the organization of the sciences.

The educational values of the vocational side of the agricultural course are also discussed.

Agricultural education: Elementary and secondary schools, B. M. DAVIS (*El. School Teacher, 11 (1911), No. 9, pp. 469–484*).—In this review of the progress of agricultural education in elementary and secondary schools, the author holds that about all that may reasonably be expected of agriculture in the elementary schools is to interest the children in country-life subjects, so that they may know the common birds, insects, trees, weeds, the meaning of some of the best farm practices, such as selecting and testing seed, how the soil holds water and means of preventing its loss, care of milk and value of its fat content, etc., and through such studies to lead the children to appreciate the fact that there is something worth while in the immediate world in which they live.

It is stated that secondary agricultural education has developed along several lines, giving rise to as many as 8 more or less distinct types, viz, agricultural-college, district, county, village-township, city, state-aided, technical, and normal. Each type is considered briefly.

References cited throughout the text are included in an annotated bibliography.

Agricultural advance in rural schools, G. W. BROWN (*Jour. Ed. [Boston], 74 (1911), No. 8, pp. 200, 201, 214*).—Industrial education is here divided into 2 distinct classes: First, that phase in which the youth and the adult overcome, shape, and fashion for use and beauty the products of the mineral kingdom and inanimate portion of the vegetable and animal world; and second, that phase of human endeavor that works with and directs the evolutionary development of plants and animals that they may be more serviceable and beautiful. The discussion centers about the second division.

Elementary school agriculture, E. B. BABCOCK and C. A. STEBBINS (*New York, 1911, pp. 65, figs. 7*) —This is a teacher's manual to accompany Hilgard and Osterhout's Agriculture for Schools of the Pacific Slope (E. S. R., 25, pp. 297). The 11 lessons given are only suggestive as to the use of the text, which should be used to supplement the lessons. They may be used in any grade from the fifth to the eighth inclusive, and the authors state that they have found it best to begin agriculture in the fifth or sixth grade.

In the appendixes may be found (1) an outline of agricultural nature study by groups, (2) a list of vegetables, and annual and perennial flowers, with cultural suggestions, and (3) lists of reference books, reference bulletins, and circulars.

A course in agriculture for the high schools of Michigan, W. H. FRENCH (*Mich. Agr. Col., Dept. Agr. Ed. Bul. 7, 1911, pp. 64*).—This bulletin is intended as a guide to superintendents and teachers in introducing the subject of agriculture into high schools. It also presents suggestions to school officers and contains the regular high school course of study, an elementary course for the

grades or for the rural schools, and suggestions to teachers as to means and methods, text-books, apparatus, and reference works.

Agricultural education in Michigan, W. H. FRENCH (*Moderator-Topics, 32 (1911), No. 6, pp. 107–109*).—Among the means which have already been used and will continue to be employed in connection with the 15 high schools in Michigan which are presenting regular courses in agriculture, are (1) the establishment of a school garden or school farm in which are grown not only the usual grains and vegetables but also those which are rare or new in Michigan, (2) the culture and breeding of corn, potatoes, and other farm crops on the home farm, (3) the construction and use of silos, and (4) pruning and spraying orchards. The author sees no reason why the schools, especially in townships and villages, should not systematically set about introducing such courses as will attract the mature farmers and farmers' wives.

Report of agriculture in the high schools of Michigan, W. H. FRENCH (*Mich. Agr. Col., Dept. Agr. Ed. Bul. 6, 1911, pp. 23, figs. 13, dgms. 4*).—This report is intended to show the plans and purposes of the work of introducing the subject of agriculture into Michigan high school courses and what has been accomplished during the past three years. The statistical material shows, in tabulated form, the population of the school districts, school attendance, enrollment in agricultural classes, expenses for instruction and character of extension work.

Development of secondary school agriculture in California, E. B. BABCOCK, C. J. BOOTH, H. LEE, and F. H. BOLSTER (*California Sta. Circ. 67, pp. 3–53*).—Among other subjects included in this circular are: (1) A brief chronological outline which summarizes the development of high school agriculture in California; (2) a report on the status of agriculture in California high schools, covering such data as the reasons for the establishment of special courses in agriculture, cost of the course in salary and equipment, relation of the agricultural courses to the other science courses, methods of the teacher as regards use of garden, experimental plat, etc., and the attitude of the community; (3) status of the course of study; and (4) a detailed report of what has been done in agricultural education at the Oxnard Union High School.

In the appendixes may be found (1) a list of equipment for agricultural sciences and special subjects, and (2) a recommended list of books for the high school agricultural library.

Cooperation between the schools and the college of agriculture, E. B. BABCOCK (*Reprint from Univ. Cal. Chron., 13 (1911), No. 3 pp. 10*).—Some of the methods by which the California College of Agriculture has aimed to help the teachers are considered in this lecture under the following heads: (1) Organizing and conducting school garden work, (2) organizing for encouraging nature study in the public schools, (3) university instruction for teachers, (4) visiting, teaching, and supervising, (5) publishing circulars and leaflets, (6) assisting at teachers' meetings, (7) organizing excursions of teachers to university stations, (8) organizing boys' and girls' clubs, and (9) assisting with the demonstration train.

Schools of agriculture, mechanic arts, and homemaking (*N. Y. State Ed. Dept. Bul. 494, 1911, pp. 32*).—This bulletin furnishes information concerning (1) the education law of 1910, providing for the establishment and maintenance of schools of agriculture, mechanic arts, and homemaking, the relations of this type of school to the general public schools, and the responsibilities of the division of vocational schools in respect to it; (2) suggested courses of study; (3) brief descriptions of some typical schools teaching agriculture, mechanic arts,

and homemaking; and (4) a list of books, periodicals, and national and state publications dealing with agriculture, farm mechanics, and home economics.

County schools of agriculture and domestic economy in Wisconsin, A. A. JOHNSON (*U. S. Dept. Agr., Office Expt. Stas. Bul. 242, pp. 24, pls. 5*).—This bulletin is an extension of an article previously noted (E. S. R., 17, p. 411), and deals with the origin, equipment, organization, and work of these schools. It also contains statistical data concerning their students, graduates, and income, and a reprint of the law providing for their establishment.

Agricultural education and culture in Bavaria at the agricultural centennial in Munich, in 1910, MAIER-BODE (*Landw. Jahrb. Bayern, 1 (1911), No. 11, pp. 759–785*).—This is a description of the exhibitions made by the Bavarian agricultural education service. It includes tables showing how the various appropriations for agricultural instruction in Bavaria are being expended, the occupations chosen by graduates of the various schools, statistics as to the attendance at the agricultural winter schools, and other data.

Forestry in nature study, E. R. JACKSON (*Nature-Study Rev., 7 (1911), No. 6, pp. 149–154*).—Some of the lines along which studies in forestry may be pursued in nature study are indicated, such as (1) the identification of the common trees; (2) simple facts as to life processes of the tree; (3) stories relating to seed distribution and the struggle for existence; and (4) the usefulness of the forest to mankind. Suggestions are also given regarding the best ways to secure material for study and to increase the interest of the pupils.

Teaching forestry by pictures (*Amer. Forestry, 17 (1911), No. 9, pp. 546–548, figs. 2*).—This article describes a traveling exhibit of 44 photographs, prepared by the Forest Service of this Department, for circulation among schools and libraries.

[School gardening at the] State University of Utah, A. E. WINSHIP (*Jour. Ed. [Boston], 74 (1911), No. 9, p. 231*).—The author of this article describes the extensive school garden of the training school of the teachers' college connected with the State University of Utah. Since there are 10 acres in the garden every pupil has an opportunity to do some real gardening, raise for commercial purposes everything that is raised in Utah, actually try dry farming, and raise crops without irrigation by the side of crops on well-irrigated lands. The seventh grade takes bookkeeping, has a bank equipment, and keeps track of each plat of ground, each crop, each class, and the garden and school as a whole. The garden pays a handsome profit each year, and this is duly appropriated either to the purchase of a horse, wagon, implements, or, as last year, to the equipment of a playground.

Every child in the higher grades of the training school must have a home garden, planted and cared for by himself and supervised by the head of the nature study department.

A brief account is also given of the work that is accomplished by the school fair and by the second, third, fourth, and fifth grades in manual arts.

NOTES.

Hawaii Federal Station.—The substation established at Glenwood on the island of Hawaii during 1911 has proved effective in bringing together the dairymen in that part of the island, and in improving the cultural methods in raising forage plants and the quality of the dairy products. On account of the heavy rainfall (sometimes as much as 300 inches per year), it has seemed best to devote considerable attention to the growing of forage crops suitable for dairy cows. This line of farming promises satisfactory profits in that locality.

At the substation located at Homestead, Kauai, good returns have been obtained from sweet corn, tomatoes, potatoes, peas, and a number of other vegetables. The difficulties which have hitherto been experienced in that locality from insect attacks have been successfully treated by insecticide methods instituted by the station.

Arrangements have been made for starting a substation in the Nahiku rubber district in Maui beginning December 1. The work at this substation will include a study of awa (*Piper methysticum*), which has recently assumed great importance as a medicinal plant, and a number of problems in the culture of Ceara rubber which are awaiting further elucidation, particularly the best method of drying rubber, the chemical determination of ash, resin, and protein in rubber obtained under different conditions and the effect upon the trees from different methods of tapping. In addition to cultivating awa as an intercrop between rubber trees, experiments will also be made with broom corn and tobacco.

Iowa College and Station.—John Buchanan, of the Ontario Agricultural College, has been added to the farm crops staff as superintendent of cooperative experiments. F. N. Marcellus has been appointed instructor in poultry work and will be in charge of experiments with poultry. W. A. Lippincott has been appointed professor of poultry husbandry at the Kansas College and Station and has entered upon his duties.

Nebraska University and Station.—H. R. Smith, animal husbandman, has accepted the chair of animal husbandry in the Minnesota University, this taking effect February 1. Claude K. Shedd resigned November 1 as adjunct professor of agricultural engineering to accept a position in the Iowa College as assistant professor of agricultural engineering.

Clemson College.—C. C. Vincent, of the Oregon College, has been appointed associate professor of horticulture, and L. A. Nivens assistant in horticulture.

Texas College and Station.—Recent appointments include J. O. Morgan, Ph. D., of the Mississippi College, as professor of agronomy, F. H. Blodgett, Ph. D., professor of biology at Roanoke College, as plant pathologist and physiologist, and H. H. Jobson, of this Department, as assistant in cotton investigations.

Washington College and Station.—E. C. Langlois, assistant horticulturist of the station, has been transferred to the college as instructor in horticulture, and D. B. Sprague, foreman of the horticultural grounds, has been made assistant in horticulture in the station. Provision has been made for the addition of a research assistant in horticulture.

West Virginia University and Station.—Dean Sanderson of the college of agriculture assumed the duties of director of the station January 1. The policy of the institution as announced is to articulate more closely the work of the college and station. W. H. Alderman, professor of horticulture, has also been appointed

horticulturist of the station, and I. S. Cook, jr., professor of agronomy, has been appointed agronomist. L. H. Sutton and E. C. Auchter, seniors respectively in the colleges of agriculture of the Wisconsin and Cornell universities, have been appointed instructors in horticulture in the college and assistants in horticulture in the station.

Wisconsin University and Station.—A lectureship on country life problems was recently added to the department of agricultural economics, to which C. J. Galpin has been appointed to study rural conditions in Wisconsin, especially with reference to social, religious, business, and educational organizations. The object is to discover the needs of rural communities, with a view to starting movements in various localities to remedy unfavorable conditions.

The state legislature provided $1,000 a year for five years for the establishment of demonstration farms in counties which appropriate $500 annually and lease a suitable tract of land free to the regents of the university. These farms will be under the general control of the director of the station. Three such farms will be started this year. In addition to carrying on experiments of special interest to the locality, demonstration meetings will be held at suitable times, especially during the growing season. Where advisable, seeds and plants grown on the farms will be disseminated among the farmers.

Representatives of the college of agriculture will soon be stationed in several of the counties of the State, especially those which have training schools for preparation of teachers, to aid in the general agricultural development of the county. In addition to giving agricultural instruction in these schools, the representatives will aid in developing the extension courses of the college of agriculture and will carry on demonstrations on land provided for that purpose by the county. Besides this, it will be a duty to study conditions throughout the county which need improvement, thus standing as a middleman between the college and the farmers.

Members of the veterinary department have recently held a number of public demonstrations in different parts of the State to show the value of hog cholera antiserum as a preventive and protective agent. Both the single or serum-alone method, and the double or serum-simultaneous method, were used. The experiments were very instructive and demonstrated in a practical manner the efficacy of the serum.

A $1,000 industrial fellowship has been established in the college of agriculture for the study of pea diseases. R. E. Vaughn (University of Vermont, 1907) has been appointed to the fellowship for the present academic year.

D. O. Mahoney, of Viroqua, and Orlando E. Clark, of Appleton, have been appointed to the board of regents, vice W. D. Hoard and E. A. Edmonds, resigned.

Affiliation of Agricultural Societies.—At the meeting of agricultural societies at Columbus, Ohio, in November, favorable action on the proposal for affiliation, which has been under consideration for the past year, was taken by the Society for the Promotion of Agricultural Science, the American Society of Agronomy, the American Society of Animal Nutrition, the Association of Official Dairy Instructors, and the American Farm Management Association. These societies adopted the proposed constitution, and designated representatives to act on the council of the affiliation.

Society for the Promotion of Agricultural Science.—The thirty-second annual meeting of the society was held at Columbus, Ohio, November 13 and 14. The address of the retiring president, Prof. S. M. Tracy, was delivered at a joint session of the society with the American Society of Agronomy. Its subject was Governmental Promotion of Agricultural Science, and it dealt with what the Government, both national and state, is doing to assist institutions and individuals in experiment and investigation for the benefit of agriculture. Professor

Tracy urged the importance of relieving the experiment station workers from extension work, promotion, and inspection, and so organizing these activities that they will not interfere with the more legitimate functions of the stations. Regarding all original investigation as an individual product, it was urged that to secure the best results each individual worker must be allowed the broadest latitude in his choice of a field of investigation.

Director W. P. Brooks, of Massachusetts, described and illustrated special apparatus for the investigation of questions connected with the nutrition of the cranberry plant, this apparatus consisting of large tile sunk in the ground, in which the plants are grown, with a removable collar which may be attached to the top to permit of flooding.

A paper by Dr. Raymond Pearl, of Maine, on the Secretory Activity of the Oviduct of the Domestic Fowl, presented the results of studies on the physiology of two of the lower divisions of the duct, which were found to perform functions not hitherto observed or described.

Dr. W. J. Beal, of Massachusetts, gave some notes on The Improvement of Timothy, describing work conducted by him while at the Michigan Agricultural College; and Dr. W. P. Headden, of Colorado, described his studies on The Effect of Nitrate on the Composition of Sugar Beets. He reported finding as high as 960 lbs. of sodium nitrate per acre in the top 6 inches of soil in the semiarid region, which was thought to prevent the beets from ripening up as they formerly did and account for low quality. In large fields which were affected he found to a depth of 1 foot 432 lbs. of sodium nitrate per acre on August 9, and 4,200 lbs. on August 27, or ten times as much. "Either of these amounts is sufficient to delay the maturing of the beet, to depress the sugar content, and to increase the injurious nitrogenous products in the juice."

The Gain in Nitrogen During a Five-Year Pot Experiment with Different Legumes was described by Dr. B. L. Hartwell and F. R. Pember, of Rhode Island. With soy beans and cowpeas there was a net gain of a ton of nitrogen per acre, derived from the atmosphere; seven-tenths of this was removed with the summer crops of legumes, and the remainder left with the stubble.

The society joined with the American Society of Agronomy, the American Society of Animal Nutrition, and the American Farm Management Association in two symposiums, one on Improvement in Methods of Agricultural Investigation, the other on Farm Management, What It Is and What Will Be Its Contribution to Agriculture. In both cases members of the society took part in the program.

At the business meeting 22 new members were elected, all of whom have qualified. The officers elected were as follows: President, Dean E. Davenport, of Illinois; secretary-treasurer, Dr. E. W. Allen, Washington, D. C.; executive committee, Dr. H. P. Armsby and Dr. H. L. Russell; custodian and assistant custodian, Dr. W. J. Beal and Prof. W. D. Hurd, of Massachusetts.

American Society of Agronomy.—The fourth annual meeting of this society was held at Columbus, Ohio, November 13 and 14, 1911, under the presidency of Director H. J. Wheeler of the Rhode Island Station. About 60 members were in attendance and over 100 persons were present at some sessions.

The meeting was divided into six sessions, three of which were independent and three joint sessions with other societies. At the joint sessions with the Society for the Promotion of Agricultural Science addresses were made by the retiring presidents of the two societies, that of President Wheeler being entitled The Status and Future of the American Agronomist.

Another joint session was held with the Society for the Promotion of Agricultural Science, the American Society of Animal Nutrition, and the American

Farm Management Association. In the symposium on the subject of Improvement in the Methods of Agricultural Investigation the society was represented by Dr. T. L. Lyon, who discussed Methods of Eliminating Error in Field Experiments, and E. G. Montgomery on Methods of Studying the Relation of Water to Plant Production.

The independent sessions of the society were given chiefly to the reading of papers, some of them along the line of standardizing field experiments, which had been the general program theme at the annual meeting in 1910.

The society is now conducting investigations looking to the standardization of various phases of agronomic research, through committees on soil classification and mapping, standardization of field experiments, terminology, and a newly appointed committee on varietal nomenclature. It is also turning its attention to methods of instruction in agronomy. Two papers along this line were presented at the meeting and sentiment favored devoting the next meeting largely to papers on this subject.

The following officers were chosen for the ensuing year: President, R. W. Thatcher; vice presidents, C. A. Mooers and L. A. Clinton; secretary, C. R. Ball; and treasurer, A. G. McCall.

American Society of Animal Nutrition.—The annual meeting of this society was held at Columbus, Ohio, November 13 and 14. The address of the president, Dr. H. P. Armsby, was upon Some Unsolved Problems. Among the problems mentioned were those relating to the digestive processes, and it was pointed out that current data are based largely on work with Carnivora and man. In attempting to transfer or apply these to Herbivora, where the food elements are quite different and where the enzym action may not be the same, unknown errors are introduced. The energy content of feeds is inadequately known, and the expenditure of energy in digestion is very imperfectly understood. It was believed that physiological studies would bring out much valuable data bearing on the chemical compounds of feeds, which would be of permanent practical value. The protein requirements for growth and other functions were stated to need revision. The imperfect condition of the theory of nutrition in the days of Wolff was held responsible for the importance laid on high protein. Such problems as these call for a high grade of scientific investigation, and can not be solved by the so-called practical feeding experiments.

Doctor Armsby believed that the progress in the field of animal nutrition was not comparable with the progress of science in other departments. There is a gap between the expert in the art of feeding and the student in the science of nutrition—our work has been too practical on the one hand and too scientific on the other. The two points of view have not been sufficiently united. The department of animal husbandry should be the best market for the fruits of the investigator; these departments should do more than breed and feed fine animals. They should apply the scientific work in practice, and not be merely sympathetic with it.

The means by which the society might promote scientific work were discussed, and it was pointed out that the ideals and conceptions must depend for success on the society which stands behind that particular branch. An important part of scientific societies was held to be to foster such work and to make favorable conditions for it.

The standing committee on experiments reported progress. Two schemes for cooperative studies have been drawn up and submitted to the members of the society during the year, but as yet neither of these has been entered upon.

Mr. George M. Rommel, of this Department, described the animal nutrition investigations in the Bureau of Animal Industry. These include the work carried on by the Bureau in cooperation with the Pennsylvania Institute of Animal

Nutrition, and the studies in the Bureau on the effect of feeding cotton-seed meal to hogs. A revision of Farmers' Bulletin 22, on Feeding Farm Animals, is in progress, the tables of composition and digestibility being compiled to embody the new data.

Members of the society joined in the symposiums on Improvement of Methods in Agricultural Investigations and on Farm Management.

American Association for the Advancement of Agricultural Teaching.—The second annual meeting of this association was held at Columbus, Ohio, November 14 and was attended by teachers, extension workers, and others interested more particularly in the promotion of secondary instruction in agriculture.

The secretary of the association reported an investigation made through the state superintendents of public instruction concerning agriculture in public elementary and secondary schools. A paper on the proper equipment for teaching agriculture in secondary schools was presented by D. O. Barto of Illinois, who discussed in considerable detail the need of collections, illustrative material, apparatus, and other equipment which must be available, either as part of the regular equipment of the school or as the property of nearby farms, if the teaching of agriculture is to be made effective.

A. C. Monahan, of the United States Bureau of Education, in a paper on What is Being Done to Prepare Teachers of Secondary Agriculture, stated that there are now over 100 secondary special schools of agriculture located in 17 different States and nearly 2,000 public and private high schools giving instruction in agriculture. About 200 of these special or public high schools are giving four-year courses in agriculture and nearly all of these are demanding agricultural college graduates as teachers. This demand is placing a heavy burden upon the agricultural colleges, which they are now endeavoring to carry by organizing departments of agricultural education and outlining courses for teachers. Of the 50 colleges for white students 36 now offer some opportunity for teacher-training in agriculture, and 9 of these have four-year prescribed courses for such teachers. The courses offered in California, Illinois, Maine, Massachusetts, Tennessee, Missouri, Mississippi, Michigan, and Kansas were described in some detail.

The need of training teachers and the kind of training they should receive for secondary school work in agriculture were the topics discussed in a paper by A. V. Storm of Iowa. Prof. Storm emphasized the necessity of the agricultural colleges taking up this work. He believed that the teachers of agriculture in secondary schools should have nothing less than a good, well-rounded, four-year agricultural course, including all of the general courses in agriculture and professional courses in psychology, history of education, principles of education, special methods for high school subjects, school management, and practice teaching.

In an informal way, the association discussed the need of adequate means of keeping its members and teachers of agriculture generally throughout the country informed concerning new textbooks and other literature on agricultural education and on the features of progress in agricultural education. A need was again expressed for an agricultural education journal which should be to the teachers of agriculture what the *Experiment Station Record* is to investigators. The association instructed its executive committee to endeavor to bring about the establishment of such a publication.

The officers elected for the ensuing year were as president, K. L. Hatch of Wisconsin; vice-president, A. B. Graham of Ohio; secretary, W. H. French of Michigan; and executive committee, A. C. Monahan of Washington, D. C., F. W. Howe of New York, and B. C. Pittuck of Oklahoma.

American Association of Farmers' Institute Workers.—This association held its sixteenth annual meeting at Columbus, Ohio, November 13 and 14, 1911. Delegates were in attendance from forty States, three of the Provinces of Canada, and the District of Columbia, representing an attendance upon institute instruction during the year of about 4,000,000 people, an expenditure of about a half million dollars annually, and a teaching force numbering 1,100 lecturers and a much larger number of local speakers.

The standing committee reports were upon institute organization and methods, institute lecturers, cooperation with other educational agencies, movable schools of agriculture, boys' and girls' institutes, and women's institutes. These reports advocated an efficient permanent local institute organization in each county, lecturers equipped with practical experience as well as scientific knowledge, institutes for young people, particularly those between the ages of 14 and 18, and institutes for women, established upon equality with those organized for men, both as to financial support and lecture service. Inasmuch as the institute is the field agent for the spread of information that other organizations wish to have the public understand and put into practice, the institute is considered under obligation to cooperate with all other agricultural institutions and societies that it may serve them most efficiently. The movable school of agriculture is deemed no longer an experiment, but a method of instruction to be generally adopted and extended.

The discussions at the general session related to plans for "following up" institute instruction, the use of a single topic for presentation before all institute assemblies in the United States and Canada during the coming year, the number of lecturers that should be supplied by the state to each institute, the proportion of state appropriations that should be used for local expenses, and the practicability of holding institute meetings monthly during the year.

Under the head of methods of work one session was devoted to a discussion of effective methods for conducting institute trains, the organization for field demonstration work, and the establishing of winter schools of agriculture and domestic science for adults. Another session was devoted to topics relating to the work and duties of the state directors. Under this head there were three papers, one discussing the organization of a central department of institute control in each State, the next the duties of the state director and his relation to the local manager, and the third the leading purpose of the annual round-up institute.

The evening session of the last day was devoted to the consideration of the condition of the negro farmers of the South, as arranged by the association at its 1910 meeting. Eight papers were presented treating different phases of this question. The general view expressed was that the condition of the negro farmer, while far below what is desired or what he is capable of accomplishing, was gradually improving. Census data as well as specific instances were given to sustain this view.

The reports from the States and Provinces showed a widespread increase in attendance and interest during the year, also that the demand for additional institute service has been so insistent and general that the directors are greatly embarrassed in endeavoring to meet the numerous requests. Larger appropriations by the States and Provinces and a considerable increase in the number of well equipped and experienced lecturers were considered indispensable to cope with the conditions.

The officers elected for the coming year were Franklin Dye, of New Jersey, president; F. H. Rankin, of Illinois, vice president; John Hamilton, of this Office, secretary-treasurer; and J. H. Miller, of Kansas, W. J. Black of Manitoba,

and Mrs. F. L. Stevens, of Porto Rico, as additional members of the executive committee.

Association of Official Seed Analysts.—The fourth annual meeting of this association was held in Columbus, Ohio, November 17, 1911.

At the morning session a report of the referee on sampling was made by C. D. Woods. The association recommended that this paper be prepared for publication by this Department.

No reports were made by the referees on germination and on purity testing, but the referees were continued and requested to take up their respective work both with laboratories having official membership in the association and others. The secretary and president were designated a committee to prepare tentative rules and regulations for testing for purity, to be published by this Department.

A resolution favoring national legislation to prohibit the importation of low grade and worthless forage plant seeds was reaffirmed in the same words as at the preceding meeting.

The afternoon session was devoted to the reading and discussion of papers as follows: A Comparison of the Germination of Various Economic Seeds Obtained by the Usual Chamber Methods with the Germination in Sand and in Soil, by G. T. Harrington; Some Essentials of Accuracy and Uniformity of Results in Seed Testing, by F. H. Hillman; The Influence of Different Temperatures, Constant and Alternating, Upon the Germination of the Seeds of the Commercially Important Grasses and Umbelliferæ, by G. T. Harrington; and Field Inspection as an Adjunct of the Pure Seed Laboratory, by H. L. Bolley and A. O. Stevens.

The officers of the previous year (E. S. R., 24, p. 97) were continued.

Southern Educational Association.—The twenty-second annual convention of the Southern Educational Association was held in Houston, Tex., November 30 to December 2, 1911. Such subjects as agricultural education, home economics instruction, and the consolidation of rural schools were considered both in general sessions of the association and in section meetings.

At one of the morning sessions The Education of the Farmer's Child was discussed by M. L. Brittain, of Georgia; the Training of Boys and Girls for more Efficient Rural Life in the South, by E. S. Richardson, of Louisiana; and Community Work for Agricultural Schools, by D. J. Crosby, of this Office. In all of these discussions the need was emphasized of improving the rural school plant by consolidation and otherwise, of revising the courses of study to make them apply to rural conditions, and of utilizing agricultural clubs, demonstrations, lectures, and other popular means for the home training of both young and old. The consolidation of schools was also considered at one session of the department of school boards.

The department of industrial education devoted one session to agricultural education, with papers by E. E. Kone, M. L. Brittain, L. N. Duncan, N. M. McGinnis, D. J. Crosby, and S. C. Wilson. In the department of normal schools the preparation of teachers of agriculture for the children of the public schools was discussed, and in the southern educational council a large share of one session was devoted to a discussion of better means for adapting education to the needs of rural schools.

The officers elected for the ensuing year were, president, H. L. Whitfield, of Columbus, Miss.; vice president, M. L. Brittain, Atlanta, Ga.; second vice president, H. F. Triplett, Beaumont, Tex.; third vice president, Mrs. J. D. Matlock, Birmingham, Ala.; and secretary-treasurer, W. F. Feagin, Montgomery, Ala.

EXPERIMENT STATION RECORD.

VOL. XXVI. ABSTRACT NUMBER. No. 3.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

A text-book of physiological chemistry, O. HAMMARSTEN, trans. by J. A. MANDEL (*New York and London, 1911, 6. ed., enl. and rev., pp. VIII+964*).—This is the sixth English edition, and a translation from the seventh German edition, which is greatly enlarged, thoroughly revised, and brought up to date. A new chapter on physical chemistry is added, while the chapter on the animal cell has been incorporated in other chapters.

A color reaction for proteins with sodium nitroprussid, V. ARNOLD (*Ztschr. Physiol. Chem., 70 (1911), No. 4–5, pp. 300–309; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 10, p. 408*).—The reaction is as follows: To from 1 to 2 cc. of the solution containing the protein from 2 to 4 drops of a 4 to 5 per cent solution of sodium nitroprussid is added, and then a few drops of ammonium hydroxid. If a protein is present a purple-red coloration is obtained. Among the products of protein cleavage cystin alone gives the reaction.

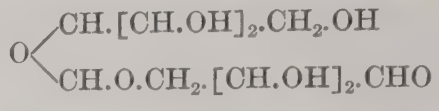
Hydrolysis of the protein of linseed, F. W. FOREMAN (*Jour. Agr. Sci., 3 (1910), No. 4, pp. 358–382; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 492–494*).—The following figures were obtained by the author as a result of hydrolyzing the protein contained in linseed meal: Glycin present, alanin 1.03 per cent, valin 12.71 per cent, leucin and isoleucin 3.97 per cent, prolin 2.85 per cent, phenylalanin 4.14 per cent, aspartic acid 1.65 per cent, glutaminic acid 11.58 per cent, serin present, tyrosin 0.65 per cent, arginin 6.06 per cent, histidin 1.66 per cent, lysin 1.19 per cent, ammonia 1.94 per cent, and tryptophan present.

From these figures it may be noted that the valin fraction is very high, while that of tyrosin is very low.

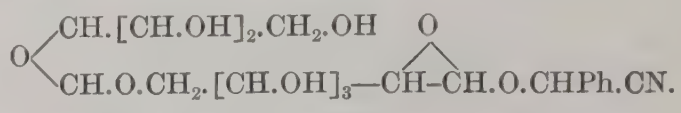
The coagulating point of egg, serum, and milk albumin, and serum globulin in ammonium sulphate solutions, K. MICKO (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 11, pp. 646–654, pl. 1; abs. in Ztschr. Angew. Chem., 24 (1911), No. 31, p. 1491*).—By determining the coagulating point of proteins in 2 solutions of known but different degrees of saturation with ammonium sulphate, the temperature at which turbidity sets in and the precipitation point being noted, it is possible to identify the various proteins present in the solution.

Constitution of vicianose and of vicianin, G. BERTRAND and G. WEISWEILLER (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 20, pp. 884–886; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 579, I, p. 15*).—Vicianose was oxidized

with bromin in the presence of calcium carbonate, and as a result calcium vicianobionate was obtained. This on hydrolysis gave calcium gluconate and l-arabinose. Vicianose, therefore, in all probability has the constitution:



The glucosid vicianin has the following composition:



See also previous notes (E. S. R., 22, p. 702; 24, p. 510).

A method for estimating lactose, galactose, and glucose in a mixture of the three, C. Foá (*Arch. Fisiol., 8 (1910), No. 2, pp. 100–110; abs. in Zentbl. Physiol., 25 (1911), No. 1, p. 11*).—The method is a quantitative one, and is based upon the observation made by Glassmann on the reaction between mercuric cyanid and glucose.

The determination of starch in wood, A. Manaresi and M. Tonegutti (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 705–713; abs. in Chem. Zentbl., 1911, I, No. 5, pp. 332, 333; Chem. Abs., 5 (1911), No. 16, p. 2663*).—Various methods were tried, but the most concordant results were obtained with the autoclave and the Allihn methods. The results obtained with the pressure flask were exceedingly low.

Methods of analysis and tests of fats and oils suggested by the special committee of committee on the uniformity of analysis of fats and fatty oils (*Jour. Indus. and Engin. Chem., 3 (1911), No. 1, pp. 50–52*).—This is a description of methods which have been tentatively proposed by the American Chemical Society, including methods for moisture and volatile matter, moisture, suspended impurities, free fatty acids, titer, unsaponifiable matter, and metallic soaps.

The quantitative estimation of volatile fatty acids in feces, R. S. McCaughey (*Ztschr. Physiol. Chem., 72 (1911), No. 1–2, pp. 140–150; abs. in Berlin. Klin. Wchnschr., 48 (1911), No. 31, p. 1425*).—As the methods usually recommended for determining the volatile fatty acids in feces do not yield reliable results, the author recommends making an alcoholic extract from a definite amount of feces, and distilling off the alcohol from the extract (after adding 10 cc. of phosphoric acid, 1.12 specific gravity), in a vacuum and with steam.

With this method, according to the author, accurate results can be obtained within 2 hours.

The quantitative determination of tannin with casein, M. Nierenstein (*Chem. Ztg., 35 (1911), No. 4, p. 31*).—About 800 analyses were made with the method, the results being from 1 to 1½ per cent higher than those obtained with the hide powder method. The method is not satisfactory for tanning extracts, although applicable to the examination of fruits and bark. The author points out its value for the dyeing and textile industries.

Is peroxidase a ferment? Hesse and W. D. Kooper (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 7, pp. 385–393; abs. in Ztschr. Angew. Chem., 24 (1911), No. 23, p. 1096*).—The results of this investigation point to the possibility that peroxidase is not an enzym, and that the reaction usually obtained with Rothenfusser's reagent (E. S. R., 20, p. 1107) is due to an alkaline milk constituent. The possibility of more than one alkaline substance taking part in the reaction is also mentioned.

The effect of the ultraviolet rays upon diastase and invertase and a mixture of both enzyms, A. CHAUCHARD and B. MAZONÉ (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 24, pp. 1709–1713; abs. in Wchnschr. Brau., 28 (1911), No. 30, p. 336*).—These tests were conducted with barley malt diastase and yeast invertase. Both enzyms were found to be destroyed quite rapidly at first by the rays, but later the process went on much slower. Malt diastase was the more sensitive of the two. When the diastase was in a mixture with invertase it was also destroyed much more quickly than invertase.

Action of the Bulgarian ferment upon monobasic acids, G. BERTRAND and R. VEILLON (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 6, pp. 330–332*).—Continuing earlier work[a] in part previously noted (E. S. R., 18, p. 871) the authors have studied the effect of the Bulgarian ferment upon the calcium salts of gluconic, galactonic, and mannonic acids.

The results show that in media containing glucose, and with either calcium gluconate, galactonate, mannonate, or lactobionate a formation of lactic acid still takes place, but only in proportion to the corresponding amount of glucose present. In a mixture of lactose with the same salts lactic acid is also produced in direct relation to the amount of sugar present, with the exception in the case of the calcium lactobionate, where the amount is much in excess of the sugar. This work shows that the Bulgarian ferment produces an endolactase only when developed in a media containing lactose.

The behavior of fungi with organic acids, R. O. HERZOG, O. RIPKE, and O. SALADIN (*Ztschr. Physiol. Chem., 73 (1911), No. 3–4, pp. 290–301*).—This test shows that the acid in the medium is not oxidized, and that neither simple salt formation, adsorption by the cellular mass, or ester formation offer an explanation of the phenomenon. No definite conclusions were drawn.

Conditions for tannic acid fermentation, L. KNUDSON (*Abs. in Science, n. scr., 34 (1911), No. 868, p. 219*).—The tests of the author point to the fact that if tannic acid is the only source of carbon present, the gallic acid produced as the result of tannic acid transformation is utilized in the metabolic processes of the organism (*Aspergillus niger* or *Penicillium glaucum*), and this is in direct proportion to the amount of growth of the fungus. Where other sources of carbon (sugar, etc.) are present the gallic acid produced may be utilized when the other carbon sources have been exhausted.

The behavior of Penicillium with acetic acid and its salts, J. REICHEL (*Biochem. Ztschr., 30 (1910), No. 1–2, pp. 152–159; abs. in Zentbl. Physiol., 24 (1910), No. 26, p. 1228*).—Free acetic acid was found to exert an unfavorable influence upon the development of *Penicillium glaucum*. This action was also manifest when glucose, cane sugar, tartaric acid, and aluminum acetate were present. The cause for this inhibiting action is not the hydrogen ion concentration nor the presence of acetate ions, but is accounted for by the presence of 3 undissociated acids. The acetates in an acid solution act in the same manner. When the fungus is grown in an acid solution a diminution in acidity takes place.

The phosphorus assimilation of Aspergillus niger, A. W. DOX (*Jour. Biol. Chem., 10 (1911), No. 1, pp. 77–80*).—*Aspergillus niger* was found to grow well on sodium orthophosphate, pyrophosphate, metaphosphate, phytin, sodium glycerinophosphate, sodium nucleinate, lecithin, casein, and ovovitellin medias, while with sodium hypophosphite there was only germination and with sodium phosphite no growth whatever.

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[a] Compt. Rend. Acad. Sci. [Paris], 148 (1909), p. 1338; Ann. Inst. Pasteur, 23 (1909), p. 402.

A new method for detecting the reducing and oxidizing properties of bacteria, W. H. SCHULTZE (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 5–6, pp. 544–551; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 579, II, p. 61*).—For detecting reductases an agar medium is prepared as follows: "Concentrated aqueous sodium hydroxid is added drop by drop to 100 cc. of boiling water containing 1 gm. of α-naphthol until the latter is dissolved. On cooling, more sodium hydroxid is added until the solution again becomes clear and light brown in color. The solution is then mixed with a 1 per cent solution of ρ-nitrosodimethylanilin (equal volumes), filtered, and mixed with about two-thirds the volume of ordinary nutritive agar (liquid) and poured into Petri dishes."

For preparing the oxidase-detecting medium a well-filtered mixture of equal volumes of a 1 per cent solution of α-naphthol prepared in the manner described above and a 1 per cent solution of paraphenylendimethyldiamin hydrochlorid is added to about 3 parts of liquefied nutritive agar. As this preparation becomes blue in a few hours it is necessary to prepare it each time when required.

A contribution to catalase estimation, O. LAXA (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 7, pp. 417–420, fig. 1; abs. in Chem. Zentbl., 1911, I, No. 22, pp. 1611, 1612*).—This is a description of an apparatus which consists of a graduated tube of 20 cc. capacity. At its lower end it tapers into an open point and to its upper end is affixed a simple stopcock. When conducting the test the author mixes 15 cc. of milk with 5 cc. of a 1 per cent solution of hydrogen peroxid and draws the mixture up into the tube until the milk is a little above the cock, then closes the cock and holds the apparatus sideways. As the oxygen begins to accumulate the milk mixture drops from the apparatus.

For comparison Koning's apparatus and Burri and Staub's apparatus (E. S. R., 21, p. 212) were used. The method agreed well with the former, but with the latter a variation corresponding to 2.2 cc. was found.

Estimation of nitrates by the phenol-sulphonic acid method, H. CARON and D. RAQUET (*Bul. Soc. Chim. France, 4. ser., 7 (1910), pp. 1021–1025; abs. in Analyst, 36 (1911), No. 419, pp. 84, 85*).—A simple way of overcoming the effects of chlorids in this test (E. S. R., 21, p. 8) has been found to be by the use of a freshly prepared solution, and conducting the test as follows: "To 1 cc. of 90 per cent phenol, 10 cc. of sulphuric acid is added, and 1 cc. of this mixture is used for the test. Chlorin up to 10 parts per 100,000 is then without effect. It is important that the residue from the water and that from the standard solution be treated alike. If the former be cooled in a desiccator, and the latter on the bench, nitric-anhydrid will be overestimated; and if the procedure be reversed, it may be underestimated by more than 50 per cent."

Quantitative separation of barium, strontium, and calcium, J. L. M. VAN DER HORN VAN DEN BOS (*Chem. Weekbl., 8 (1191), No. 1, pp. 5–10; Chem. Zentbl., 1911, I, No. 18, pp. 1379, 1380; abs. in Analyst, 36 (1911), No. 424, p. 364*).—The diluted solution containing the 3 elements is acidified with acetic acid. The barium is precipitated as a chromate with ammonium chromate, and after evaporating the filtrate almost to dryness, and dissolving out the calcium present with 50 per cent alcohol, the strontium is determined as chromate. The calcium is determined in the alcoholic filtrate.

An optional volumetric method is also given.

The separation and estimation of barium associated with calcium and magnesium, by the action of acetyl chlorid in acetone upon the mixed chlorids, F. A. GOOCH and C. N. BOYNTON (*Amer. Jour. Sci., 4. ser., 31 (1911), No. 183, pp. 212–218*).—From this work "it appears that this method, which rests upon the action of a 4:1 mixture of acetone and acetyl chlorid upon the concentrated

solution of the chlorids, affords easy and exact means for the separation and estimation of barium associated with calcium and magnesium. It is not recommended for the separation of barium from strontium."

Estimation of minimum quantities of calcium in the presence of a large excess of magnesium, C. LIESSE (*Ann. Chim. Analyt., 16 (1911), No. 1, pp. 7, 8; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 580, II, p. 154*).—The material under examination is dissolved in 25 parts of hydrochloric acid, 100 parts of water are added to this, and the solution is neutralized with ammonium hydrate, using phenolphthalein as the indicator. The precipitate which forms (consisting of silica, alumina, and iron) is filtered off and to the filtrate enough water is added to make 1,500 cc. for each gram of sample used. To the solution 4 gm. or more of ammonium oxalate is added and it is then acidified with acetic acid. After 2 hours of standing, stirring several times during the interval, the calcium oxalate is collected on a filter as usual, and weighed.

Separation of strontium from calcium, L. MOSER and L. MACHIEDO (*Chem. Ztg., 35 (1911), No. 38, pp. 337, 338; abs. in Chem. Abs., 5 (1911), No. 15, p. 2474*).—The methods based on the following principles, according to these authors, do not give good separations—the precipitation of strontium with ammonium sulphate, the conversion of strontium oxalate into strontium sulphate with potassium sulphate, and the solution of calcium nitrate in strong nitric acid. As anhydrous calcium nitrate was found to be soluble in both ether and alcohol and barium and strontium nitrates insoluble, good separations could be obtained. Amyl alcohol was found to offer no advantages over ether or ethyl alcohol.

The lime in basic slag, J. HENDRICK (*Jour. Soc. Chem. Indus., 30 (1911), No. 8, pp. 520–522; abs. in Chem. Abs., 5 (1911), No. 15, p. 2475*).—"The author extends his experiments [E. S. R., 22, p. 25] at the suggestion of W. Smith[a] that the hydrolysis of NH_4 salts had not been considered in measuring the basic lime in slag by distillation with $(NH_4)_2SO_4$. Further experiments show that the conclusions are not materially affected by this fact. Further tables are submitted showing that slag possesses a considerable portion of lime capable of acting as a base in the soil, and of neutralizing acids produced therein, as in fertilizing with $(NH_4)_2SO_4$. In determining this basic-lime content, distillation with NH_4Cl is superior to distillation with $(NH_4)_2SO_4$, as the former is less hydrolyzed. The alkalis in glass are a much greater source of error in the method than the factor of hydrolysis. Tables of slag analyses as to basic content are only of comparative value when the method is uniform."

Rapid determination of sulphuric acid with the porous clay crucible, F. KLEIN (*Amer. Jour. Pharm., 83 (1911), No. 7, pp. 342–346, figs. 3*).—A description and illustration of a porous clay crucible with which it is possible, according to the author, to make a dozen or more determinations of sulphur in the time which it usually takes to make a single filter determination.

The analysis of copper mixtures meant for spraying purposes, E. DURIER (*Ann. Falsif., 4 (1911), No. 29, pp. 133–138, figs. 3*).—Particular attention should be given to the proper sampling of spraying chemicals, as otherwise, according to this author, erroneous conclusions are often drawn. This applies especially to those mixtures which contain substances of various degrees of fineness, in which the larger particles and most valuable portion (copper salts) during transportation usually settle to the bottom of the sack, while the lighter and inferior portion remains on top. Zonal analyses of the various portions of the contents of such sacks are given for purposes of illustration. The cause could not be attributed to an increase or decrease in moisture.

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[a] Jour. Soc. Chem. Indus., 30 (1911), pp. 253–256.

A method of sampling and one for the electrical determination of copper as used by the author are given.

The detection of traces of hydrogen cyanid, G. D. LANDER and A. E. WALDEN (*Analyst, 36 (1911), No. 423, pp. 266–270*).—As the picrate test is a very sensitive test for hydrogen cyanid, although, according to some authors, it is a typical reduction reaction and can not be considered specific for hydrogen cyanid, the authors sought to compare it as regards sensitiveness with potassium ferrocyanid. The experiments show that the ferrocyanid test is equal if not superior to the picrate test, and that it may be applied with certainty for the detection of minimal quantities of hydrocyanic acid in the brains of poisoned animals.

The method of procedure and the limits of sensitiveness are given.

Salt in cyanids, G. E. COLBY and G. P. GRAY (*California Sta. Circ. 72, pp. 3*).—As the presence of common salt in commercial cyanids intended for fumigation work brings about a decomposition of some of the hydrocyanic acid contained in the cyanid salt (E. S. R., 25, p. 314), the authors sought to determine whether the method used for liberating the gas has any influence upon the amount of hydrocyanic acid decomposed.

The results show that the amount of hydrocyanic acid decomposed is far greater with the "wet" than with the "dry" method. It is concluded that although "cyanid in solution suffers very great decomposition during generation when chlorids are present, the commercial cyanids now being used are good for fumigation purposes even if they contain the largest amount of common salt yet found, provided the hydrocyanic-acid gas is generated by the method usually followed in practice."

Analysis of creosotes for the preservation of wood, R. ESTOR (*Matières Grasses, 4 (1911), No. 36, pp. 2209, 2210; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 10, p. 610*).—The specifications of the French industrial societies for creosote are presented in detail.

The creosote on the market for impregnating wood used for railway ties, etc., was found to contain from 15 to 20 per cent of phenols, chiefly cresols, a little naphthalene in solution, and various hydrocarbons of unknown composition. These were found to distill almost completely between 150 and 300° C., and had specific gravities in the neighborhood of 1.055 at 15° C. The most common adulterant found was green oil.

The characteristics of creosote and tar oils available for wood preservation, C. N. FORREST (*Jour. Soc. Chem. Indus., 30 (1911), No. 4, pp. 193–196*).—A detailed discussion in this regard.

The action of oils and tars in preventing mold growth, J. M. WEISS (*Jour. Soc. Chem. Indus., 30 (1911), No. 4, pp. 190, 191*).—A comparison was made between oils and tars in regard to their value for preserving wood. The points established were that coal-tar creosote possesses greater antiseptic properties for mold than water-gas tar distillates, the ratio as regards efficiency being about 6:1. This relative efficiency also holds good for undistilled tars.

Some recent publications on creosote oil, S. R. CHURCH (*Jour. Soc. Chem. Indus., 30 (1911), No. 4, pp. 191–193, charts 3*).—A review and critical discussion of the literature in regard to the valuation of creosote for impregnating wood and other materials.

A method for the complete destruction of organic matter for the purpose of detecting mineral poisons, P. BRETEAU (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 4, pp. 199, 200*).—The organic matter is first treated with sulphuric acid (specific gravity 1.84) and then (through a glass tube which runs to the bottom of the combustion flask) with nitrous vapors and the aid of a gentle heat. The colorless or slightly yellow solution obtained is finally evap-

orated in a platinum dish and treated in the usual manner. According to the author, it requires about 4 hours to destroy completely 300 gm. of organic matter (organs).

Experiments on the water content of lard from Danish packing houses, N. O. HOFMAN-BANG and E. HOLM (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 73 (1911), pp. 28*).—The results of the investigation indicate that lard containing less than 0.3 per cent moisture (the maximum water content allowed in lard destined for export to Germany) can be obtained by adding from 2 to 3 per cent of water to the refining kettle and then heating the fat until it is entirely clear; at this point the temperature will rise to 110° C. If the lard remains clear when cooled to 65° it is stated that it will contain less than 0.3 per cent water.

The report also gives an account of investigations in regard to the fat content of fat residue cakes and of extracting grease for making soap.

Determination of sucrose in cane molasses; use of hydrochloric acid and urea for the direct polarization, H. PELLET (*Internat. Sugar Jour., 13 (1911), No. 148, pp. 206–209*).—A study was made of the application of Andrlík's hydrochloric acid and urea mixture and of sulphurous acid to the analysis of cane products, particularly cane molasses.

The reaction of the 2 reagents was found to be somewhat dissimilar. The reason was supposed to lie in the fact that in low-grade cane products the sugars and nonsugars are not uniform. In low-grade products the reducing substances vary from 10 to 30 per cent.

As the levorotation of an invert sugar increases with the concentration of hydrochloric acid in the solution, the value eventually found for sucrose is too high when this acid is used for inverting the sucrose present in the same solution. "If, however, before inversion the liquid is polarized with the addition of 10 cc. of the hydrochloric acid and urea mixture, and this direct polarization taken with the inversion polarization (for which only hydrochloric acid, and no urea is used), the actual amount of sucrose present is obtained, since the change of rotation is due only in this case to hydrolyzed sucrose. . . .

"The application of sulphurous acid to cane molasses [was studied], but in this case this acid [did] not give the same results as in the analysis of beet products, since it has not the same action upon the levorotation of reducing sugar as hydrochloric acid. Hence the hydrochloric acid and urea is indispensable for effecting the exact estimation of sucrose in cane molasses."

Analysis of honey, with special reference to the nitrogenous constituents, R. LUND (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 1, pp. 38–58; abs. in Chem. Zentbl., 1911, I, No. 15, pp. 1158, 1159; Analyst, 36 (1911), No. 423, p. 277*).—About one-half of the total nitrogen in genuine honey, according to this author, consists of protein nitrogen and the other half of amino nitrogen. The total nitrogen present in genuine honeys was from 0.31 to 0.45 per cent, while artificial honeys contain only from 0.106 to 0.2 per cent. The amount of ammonia present is very small, and can be ignored.

For estimating the protein nitrogen in honey the author uses the following method: A solution consisting of 2 gm. of phosphotungstic acid in 20 gm. of dilute sulphuric acid (1:4) and 80 cc. of water is used as the precipitating reagent. "Five cc. of this reagent is added to 20 cc. of a filtered 10 per cent solution of honey, the mixture being diluted to 40 cc. and stirred. The precipitate separates better in this way than when tannic acid is used, and the results are equivalent. Precipitation is effected in the test tubes employed by Barth for the estimation of tannin in wine. The volume of the precipitate is read off after 24 hours, and in the case of natural honey it ranges from 0.6

to 2.7 cc. Artificial honey gives either no precipitate or less than 0.5 cc. If proteins have been added to artificial honey, differentiating tests, such as Bräutigam's, Ley's, and Fiehe's reactions, may be applied."

Detection and determination of the protein substances of honey, E. MOREAU (*Ann. Falsif., 4 (1911), No. 37, pp. 36–41*).—A description of methods for the qualitative and quantitative estimation of proteins in honey, which is accompanied by the results obtained for total and heat-coagulable proteins. It was noted from the results that the proteins of honeys are very variable in amount and nature, and furthermore there is an indication that a proteolytic ferment is present in honey.

Constituents of the apple, C. THOMAE (*Jour. Prakt. Chem., n. ser., 84 (1911), No. 16–17, pp. 247, 248*).—This is a preliminary study of the odoriferous substances in the peel of the apple.

When apple peels were subjected to distillation with steam, and the distillate (which had a pleasant apple odor) was extracted with ether, the solvent evaporated, and the residue obtained with absolute alcohol extracted, a crystalline compound was found to remain. The filtrate from this compound when evaporated yielded a yellow oil having a pronounced apple-like odor. On rendering the peels alkaline by pouring soda solution over them, and then extracting with ether and evaporating off the solvent, there was left behind a colorless pulverulent substance, which was soluble in hot alcohol, and after purification had a melting point of over 200° C. and was odorless. This substance in combination with the fat or resin present in the peel of the apple probably prevents incipient drying of the fleshy part of the apple.

The detection and rôle played by polyatomic phenols occurring in apples as glucosids, H. P. BASSETT (*Abs. in Science, n. ser., 34 (1911), No. 868, p. 224*).—Apples contain a glucosid which resembles phloridzin and an enzym which hydrolyzes it and liberates a polyatomic phenol. This in turn is converted into a phlobaphen by an oxidase. It is suggested that as this oxidase reaction renders the fluid germicidal it must have a protective action for the fruit.

Quantitative determination of starch sirups in fruit products, K. BECK and P. LEHMANN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 7, pp. 393–405; abs. in Chem. Zentbl., 1911, I, No. 22, p. 1611*).—The insoluble portion of the fruit products can be determined either by the Juckenack and Prause procedure,[a] by one of the methods proposed for determining the extract in wine (determination of the total dry substance and the invert extract), or by a method in which a definite amount of the product is digested with a definite weight of alcohol. For determining the rotation of the optically active soluble substances the constants for dry substance of the soluble part and starch sirup must be known. The specific rotation $[a]_D$ for the first named can be taken as —20°.

The results of examining starch sirup for dry substance and the specific rotation were found to agree well with the figures found in the literature. The formulas involved are stated in detail, and the results of analyzing 51 fruit products to illustrate the above points are given.

Electrolytic determination of copper in conserves, K. LAKUS (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 11, pp. 662–664; abs. in Ztschr. Angew. Chem., 24 (1911), No. 31, p. 1491*).—A description of a method in which the copper deposition is uniform and strongly adherent to the platinum dish.

Vinegar, its examination and judging (*Ztschr. Angew. Chem., 24 (1911), No. 31, pp. 1482–1485*).—A discussion of the detection of formic acid in vinegar

[a] Ztschr. Untersuch. Nahr. u. Genussmtl., 8 (1904), No. 1, pp. 26–36.

essence and the examination and judging of vinegar, by Messrs. Schuhmacher, Fröhlich, Rothenbach, Zucker, Neufeld, Kerp, Bömer, Mooskopf, and Rupp, at the general meeting of the Association of German Food Chemists held at Dresden.

Pyridin in vinegar, H. FINCKE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 11, pp. 655–658; abs. in Ztschr. Angew. Chem., 24 (1911), No. 31, p. 1491*).—Since the brandy tax law went into effect in Germany vinegar in many instances has been prepared from alcohol denatured with pyridin.

For detecting the pyridin the author recommends treating 500 cc. of vinegar with 10 cc. of 25 per cent sulphuric acid, evaporating the mixture to a bulk of from 20 to 50 cc., and making it alkaline. The pyridin is then distilled into an excess of hydrochloric acid solution, the distillate rendered alkaline, sodium hypobromite solution added until the fluid remains yellow in color, and 50 cc. of the fluid distilled into from 10 to 30 cc. of decinormal hydrochloric acid solution. The excess of acid is titrated back with decinormal alkali solution, using methyl orange as the indicator.

The judging of brandies, A. JUCKENACK (*Ztschr. Angew. Chem., 24 (1911), No. 31, pp. 1477–1479*).—In this discussion are included cognac, rum, arrak, fruit brandies (raspberry, apple, etc.), corn brandy, bitters, cordials, and miscellaneous brandies.

The estimation of soft resins in hops, R. H. CARTER (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 375–385, pls. 2*).—The object of this work was to determine the relative amounts of soft resins present in English and German varieties of hops grown at Wye, England, German varieties grown in Germany, and American varieties grown in America.

The percentage of resins in 13 samples of English hops of unknown parentage was found to vary between 8.36 and 13.95, average 10.41; 13 seedlings of known parentage, between 9.62 and 11.53, average 10.69; 9 German varieties of hops grown in England, between 10.77 and 13.63, average 11.97; 5 English varieties, between 10.6 and 13.7, average 11.94; 1 German variety grown in Bavaria, 17.08; and 4 American varieties grown in America, between 13.34 and 16.82, average 15.12.

The detection of castor-bean constituents in feeding stuffs, W. MOOSER (*Landw. Vers. Stat., 75 (1911), No. 1–2, pp. 107–134*).—This is an investigation as to the value of the precipitation test for detecting castor-oil seeds in feeding stuffs.

Rice-feed meal, sesame meal, and peanut meal free from ricinus, when treated and injected into animals according to Miessner's specifications (E. S. R., 22, p. 81), were found to give a reaction indicating the presence of castor-oil seeds. When normal serum was substituted for the specific serum in Miessner's procedure cotton-seed meal, linseed meal, and rice-feed meal, all in a concentration of 4 per cent, were found to give a positive reaction, but when the amount was reduced to 1 per cent it was negative. Rice-feed meal gave the most positive reaction. Normal serum with a 4 per cent concentration of ricinus also acted as a specific serum.

The author, assuming that some of the toxic principles are very soluble in alcohol (arachin, for example, from peanut cake) and that ricin is only slightly so, has elaborated a method for detecting castor-oil seeds based on this principle. With the new method he believes that the concentration of the solution and the time of exposure to the antiserum will be of no moment when seeking to detect the above impurities in feeds.

The effect upon the reaction of heating castor-oil seed cake is also considered.

General considerations in regard to the microscopic analysis of feed cakes, L. PALMANS (*Ann. Gembloux, 21 (1911), No. 4, pp. 184–200, figs. 12*).—This is

a discussion in regard to the histology and microscopical analysis of the various vegetable feeds for animals which are sold in the form of cakes.

Customs examination of rye and wheat brans, R. Woy (*Ztschr. Öffentl. Chem., 17 (1911), No. 6, pp. 101–109; abs. in Chem. Zentbl., 1911, I, No. 19, p. 1447; Analyst, 36 (1911), No. 424, p. 850*).—Judging bran on the basis of its ash content is considered irrational by the author, who also believes that the more recent German official method, which takes into account the proportion of bran which passes through a fine sieve, is not much better. He deems the determination of the starch content the proper method for the valuation of such materials.

The author gives preference to the Ewers method (E. S. R., 21, p. 108). Working "with 5 gm. substance, and polarizing in a 200 mm. tube at 20° C., [he] finds the correct factor (assuming the use of the Soleil-Ventzke scale) to be 1.892. It is suggested that some substance other than coal dust might be prescribed for denaturing bran—some substance that would not detract so much from its commercial value, whilst attaining the object of the customs authorities."

Errors in milk examination, H. Pflugradt (*Molk. Ztg. [Hildesheim], 25 (1911), No. 11, pp. 183, 184*).—In this article the author discusses the reliability of the Gerber acid butyrometric test, and calls attention to the necessity of having properly graduated apparatus for doing the work.

Refractometry of milk, C. Mai and S. Rothenfusser (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 5, pp. 150, 151*).—This is a discussion in regard to certain statements of Rühm (E. S. R., 25, p. 207), in reference to the value of the refraction of the calcium chlorid milk serum and the nitrate reaction for detecting added water in market milk. The authors consider both of these tests very reliable, and they do not agree with certain statements made in Rievel's text-book (E. S. R., 19, p. 471).

[Refractometry of milk], Rühm (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 5, pp. 151, 152*).—This is a reply to Mai and Rothenfusser, in which the author states that he does not deny the scientific value of the refractometric method, but that it is not a practical one for the use of the veterinarian.

Refractometry of milk, Rievel (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 6, pp. 169–171*).—This is a polemical article, in which the author points out that he does not deny the practical utility of the calcium chlorid milk serum refraction test, but is inclined to believe that the test can not be wholly relied upon for detecting added water to milk and should be used only in conjunction with other methods. In regard to the reliability of the nitrate reaction for detecting watering, he can not attribute the value to this test which is given it by Mai and Rothenfusser.

A comparison between the refraction and the specific gravity of milk serum for the detection of added water, S. Bull (*Jour. Indus. and Engin. Chem., 3 (1911), No. 1, pp. 44–46*).—As a preliminary to this work the author made a parallel determination of the refraction of the milk serum (acetic acid) and the fat content (Babcock method) of milk. The results show that no relation exists between the two, and that a milk serum from the same cow will vary in refraction if taken at different times. The author expresses the opinion that in view of this finding the method is not an accurate one for detecting added water, unless the milk is known to come from a large herd.

The other tests in regard to the refraction and specific gravity showed that "the specific gravity of the serum is a much more delicate test for added water than the refraction, but owing to the fact that all authorities are not agreed as to the low limit of the specific gravity of pure milk serum, the author would say that it is not as reliable in all cases as the refraction. Both methods combined

should furnish both a delicate and reliable guide to the detection of added water in milk. As both the methods may be used on the same serum, and as the determinations are easily made after the serum has been obtained, it appears that a combination of the two methods would insure the certain detection of added water, if in any quantity as would be used in fraudulently adulterated milk."

Cryoscopic examination of milk, L. STOECKLIN (*Ann. Falsif., 4 (1911), No. 31, pp. 232–257, figs. 8; abs. in Analyst, 36 (1911), No. 424, pp. 345, 346*).—As a result of examining 2,500 samples of milk covering a period of 4 years the author concludes that with the cryoscopic method one can distinguish between a watered and an unwatered milk without taking into consideration the age of the animal or the period of lactation. It was also found that where the lactic acid content of the milk increases to 1 gm. per liter the freezing point increases from about 0.045 to 0.05° C. Potassium bichromate (1 gm.) increases the acidity equivalent to 0.614 gm. of lactic acid. The amount of bichromate that will influence the freezing point of a milk containing it is found according to the formula $L=A-(1.20+Cr\times0.061)$, where L equals the real lactic acid present in a liter of milk, A equals the total acidity expressed as lactic acid, and Cr the weight in grams of potassium bichromate in a liter of milk. Where a milk contains an addition of 10 per cent of water the nonlactic acidity is reduced from 1.2 to 1.08, and for a milk which contains 20 per cent of water to 0.96. One gm. of potassium bichromate was found to increase the freezing point of a milk by 0.018° C.

The behavior of the Schardinger reaction in colostral milk from cows, R. REINHARDT and E. SEIBOLD (*Biochem. Ztschr., 31 (1911), No. 3–4, pp. 294–320*).—The cows used in these tests were animals quartered in the obstetric clinic of the Royal Veterinary High School at Stuttgart. Some of the milks examined were obtained under ordinary conditions and others under sterile conditions.

It was noted that almost invariably after the birth of the calf and some days thereafter the milk (colostrum) yielded the Schardinger reaction. With fresh-milking cows, as defined by Schern (E. S. R., 21, p. 614) the reaction did not occur, and only reappeared from about 3 to 8 weeks post partum. Suckling did not have any influence upon the return of the Schardinger reaction. General diseases and udder inflammations had an influence upon the reaction, but sterile milk gave the same reaction as milk obtained under ordinary conditions. The enzym (reductase) was not found to have any relation to the amount of fat in the milk, but the amount of enzym was found to be greatest in the cream and the residual milk. On the other hand, the enzym was never totally absent, not even in the milk of fresh-milking cows, because in all cases traces of the enzym could be noted in the cream and residual milk. No antireductase was observed. The relation between the enzym content of freshly lactating cows and cows in the late stages of lactation was found to be only a qualitative one. Ten cc. of the milk from old lactating cows was usually found to decolorize 1 cc. of the Schardinger reagent within from 4 to 12 minutes, but the time between the milkings had some influence upon the appearance of the reaction.

Fractionated milking tests showed that the middle and residual milks had the highest enzymatic activity, while the initial milks showed the least. The individual quarters were found to yield various amounts of enzym. The enzym is destroyed at temperatures beginning at 65° C., but the optimum temperature for milks from late stages of lactation was found to be 65° C. and for fresh-milking cows it was 45° C.

The authors expressed the opinion that the enzym, if such exists in the milk, is present in a preformed state.

The Schardinger enzym in the milk from cows having diseased mammary glands, R. REINHARDT and E. SEIBOLD (*Biochem. Ztschr., 31 (1911), No. 5–6, pp. 385–396*).—The occurrence of udder inflammations, according to the authors, has an influence upon the Schardinger enzym content of milk which is dependent upon the nature of the chemical changes in the secretion, the scope of the disease, and the stage of the disease. It was also noted that as long as the secretion has a normal color and consistency the reaction is either normal or only slightly shortened. In extreme cases the reaction time is extended. The test can not be employed as a diagnostic agent for detecting mastitis in cows.

Comparison of the reductase test with other hygienic tests for milk, C. BARTHEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 9, pp. 513–534, figs. 7; abs. in Analyst, 36 (1911), No. 424, pp. 346, 347*).—This article has been noted from another source (E. S. R., 24, p. 515).

The amount of animal alkaloid in sterilized milk and in milk kept under certain other conditions, N. D. AWERKIJEW (*Ztschr. Physiol. Chem., 72 (1911), No. 5–6, pp. 347–362*).—A volatile animal alkaloid (ptomaine), having the formula $C_{36}H_{69}NO_6$, was isolated from sterilized milks which were exposed either to air and light, to light alone, or to air alone. The greatest amount of alkaloid was produced when milk was exposed to both air and light, and the least when the milk was exposed to light only. The alkaloid is termed "fetterin" and is supposed to originate from the decomposed fat. The ptomaine was not produced when the milk was not exposed to air or light.

Methods for detecting heated milk in dairy products, especially in butter, S. ROTHENFUSSER (*Milchw. Zentbl., 6 (1910), No. 10, pp. 468–470*).—The author points out in discussing Hesse and Kooper's work (E. S. R., 24, p. 612) that in his investigations (E. S. R., 20, p. 1107) where the term paraphenylendiamin is used a solution of paraphenylendiamin hydrochlorid was employed. He gives the formula for preparing the solution. He furthermore states that the use of benzidin for detecting heated milk was first proposed by him (E. S. R., 20, p. 1107) and not by Peters and Wilkinson (E. S. R., 20, p. 1108). The benzidin and the guaiacol-paraphenylendiamin reactions, according to the author, are chiefly of value when used with a lead serum.

Detection of margarin in butter, H. SERGER (*Chem. Ztg., 35 (1911), No. 67, pp. 602, 603; abs. in Molk. Ztg. [Hildesheim], 25 (1911), No. 58, pp. 1096, 1097*).—As a result of an act passed in Germany in 1897 all margarin examined must have an addition of 10 per cent of sesame oil.

For detecting sesame oil the Baudouin, Soltsien, Grace-Calvert, and Cavallis tests have thus far been proposed. The various factors, such as dyes, which influence the above reactions are considered in detail. The feeding of sesame cake to milch cows is also discussed.

The brine-soluble compound found in cheese, L. L. VAN SLYKE and A. W. BOSWORTH (*Abs. in Science, n. ser., 34 (1911), No. 868, p. 222*).—During the ripening of Cheddar cheese the authors have repeatedly noted the production of a protein, which is soluble in a 5 per cent sodium chlorid solution and which always has associated with it the element calcium. A further peculiarity is that all the calcium in the cheese could never be obtained by extraction with water, a part of it always being present in the brine extract as mentioned above. In a 2-year-old cheese 40 per cent of the nitrogen was present in the brine-soluble form.

"In Camembert cheese, however, the reverse is found. After the first few hours this cheese contains no brine-soluble compound and all the calcium is found in the water extract. The brine-soluble compound is formed in this cheese, but, owing to the method of making, more acid is allowed to develop than in Cheddar cheese and, as a consequence, the brine-soluble compound loses

its calcium and thereby becomes free paracasein, which is insoluble in brine solution.

"[The authors] believe that, according to the evidence in hand, the following equation represents the reaction which takes place where the compound in question is taken into solution by a salt solution: Calcium caseinate + 2 NaCl $\rightleftarrows$ sodium caseinate + $CaCl_2$. [Furthermore] that the mass action, thus represented, is also connected with the precipitation produced upon adding calcium chlorid to the brine-soluble compound after its solution has been freed from excess of chlorids by dialysis."

Cane sirup making, H. P. AGEE (*Louisiana Stas. Bul. 129, pp. 5–36, pl. 1, figs. 17*).—It is the purpose of this bulletin to point out the most important facts in regard to sirup making to persons who are engaged, or are about to engage in sirup making on a small or large scale. Among its contents are included data as to the market grading of sirup, making sirup for special markets, the kind of cane to use, milling the cane, clarifying and sulphuring the juice, the use of lime, first evaporation of juice, second evaporation of sirup, cooling and settling of sirup, the equipment of small and large plants, the use of copper piping, containers for sirup, sterilization of sirup for preservation, the canning of sirup, cleanliness in manufacture, dealing with a high-class retail trade, yields to be expected, and how to prevent crystallization in sirup. Appendixes A and B deal with open kettle sugar and molasses, sorghum sirup, fall planting of cane, preparation of land, drainage, off-barring, use of the scraper, fertilization, cultivation, and kinds and amounts of fertilizers.

The bulletin is illustrated with cuts of machinery and other apparatus used in the industry, and contains a design of a 600-ton plant.

Sugar-cane wax, G. BARGER (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1910, No. 9, pp. 355, 356; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, pp. 178, 179*).—This is a review of the work of A. Wijnberg, previously noted (E. S. R., 21, p. 710).

Manufacturing alcohol from sugar beets, A. KOLOCZEK (*Ztschr. Spiritusindus., 34 (1911), Nos. 19, pp. 239, 240; 20, pp. 252, 253; abs. in Ztschr. Angew. Chem., 24 (1911), No. 32, pp. 1548, 1549*).—This is a detailed description of the process, to which are appended some estimates in regard to the cost of production as compared with that of alcohol produced from potatoes. Hungarian conditions serve as a basis for these figures.

Bagasse as a paper-making material, VON POSSANNER (*Wchnbl. Papierfabrik., 42 (1911), No. 13, pp. 1157, 1158; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 8, pp. 483, 484*).—Bagasse as a source of raw material for white paper was first pointed out by Wrede.[a] The author agrees with his views, but points out that it is necessary first to separate the small parenchyma cells of the pith from the useful fibers before attempting to bleach the pulp. "Only by a combined acid and alkaline process of digestion can bagasse be used as a raw material for the manufacture of fine white papers."

METEOROLOGY—WATER.

Monthly Weather Review (*Mo. Weather Rev., 39 (1911), Nos. 8, pp. 1135–1300, pls. 9, figs. 6; 9, pp. 1301–1466, pls. 9, figs. 2*).—In addition to the usual climatological summaries, weather forecasts and warnings for August and September, 1911, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, the numbers contain the following special papers:

[a] Jour. Soc. Chem. Indus., 30 (1911), No. 5, p. 278.

No. 8.—The Small Hurricane of August 11–12, 1911, at Pensacola, Fla., by W. F. Reed, jr.; Tornado near Canton, N. Y., by W. J. Bennett; Report of Severe Local Storm, Galena, Ill., on August 16, 1911, by J. H. Spencer; Interior Temperatures in Large Masses of Concrete during Time of Setting, by W. D. Maxwell; A Phenomenon of Lightning Discharge, by F. E. Nipher; Protecting Truck Against Frost, by E. W. Gruss; Value of Mountains to Climatic Safety for the Fruit Grower, by J. C. Alter; Notes on the Rivers of the Sacramento and San Joaquin Watersheds for August, 1911, by N. R. Taylor; Reflection of Fog Signals at Point Reyes Light, Cal., by J. Jones; Frost Rings (illus.), by R. E. Smith (see page 244); The Winds of the Yosemite Valley (illus.), by F. E. Matthes; Influence of Artificial Heating on the Climate of Cities (illus.), by G. W. Mindling; and Is the Heat Generated by Great Cities Changing Their Climates? by A. H. Palmer.

No. 9.—Severe Wind Storms at Springfield, Ill., by J. C. Jensen; Storm of September 13, 1911, Springfield, Ill., by C. J. Root; A Severe Local Storm, by R. H. Sullivan; The Drought and Hot Weather of 1911 in Kansas, by S. D. Flora; Cloudburst at Cooney, N. Mex., by F. H. Brandenburg; New Irrigation Project on the Colorado River, by L. F. Jesunofsky; Notes on the Rivers of the Sacramento and San Joaquin Watersheds for September, 1911, by N. R. Taylor; Weather in the San Joaquin Valley, Cal., by W. E. Bonnett; Variation of Rainfall with Altitude, by A. G. McAdie; Water Resources in Oregon and their Development, by J. T. Whistler; Charts of the Atmosphere (a Review of), by A. G. McAdie; and Variations in Rainfall (illus.), by E. A. Beals.

Meteorological records for 1910 (*New York State Sta. Rpt. 1910, pp. 575–587*).—Tables are given showing tridaily readings at Geneva, N. Y., of standard air thermometers for each month of the year; daily readings of maximum and minimum thermometers at 5 p. m. for each month of the year; a monthly summary of maximum, minimum, and standard thermometer readings; average monthly and yearly temperatures since 1882; monthly and yearly maximum and minimum temperatures from 1883 to 1910, inclusive; and rainfall by months since 1882.

Meteorological summary for 1910, C. A. Patton (*Ohio Sta. Bul. 230, pp. 337–355*).—This summary includes as usual notes on the weather of each month of the year and tabulated daily and monthly records of observations at the station at Wooster, Ohio, on temperature, precipitation, cloudiness, and direction of the wind, and for comparison, similar data for 23 previous years (1888–1910) at the station and for 28 years (1883–1910) in other parts of the State.

The mean temperature for the year at Wooster was 49.2° F., for the State 50.8°; the highest temperature at the station was 94°, July 25 and August 15 and 16, for the State 98°, July 2 and August 15; the lowest temperature at the station was —12°, February 19, for the State —25°, February 19. The annual rainfall at the station was 35.91 in., for the State 36.17 in. The number of rainy days at the station was 133, for the State 110. The prevailing direction of the wind was southwest at the station and for the State.

A simple method of purifying infected water for drinking purposes, G. G. Nasmith and R. R. Graham (*Jour. Roy. Army Med. Corps, 17 (1911), No. 1, pp. 50–54*).—This article reports the successful use for this purpose of chlorid of lime as follows: "(1) Take a teaspoonful of chlorid of lime, containing about one-third available chlorin, and remove the excess of powder by rolling a pencil or other round object along the top of the spoon, or by flattening it with a penknife blade, so that the excess will be squeezed off.

"(2) Dissolve the teaspoonful of chlorid of lime in a cupful of water, making sure that all lumps are thoroughly broken up, and to it, in any convenient receptacle, add 3 more cupfuls of water.

"(3) Stir up the mixture, allow to stand for a few seconds in order to let any particles settle (this stock solution if kept in a tightly-stoppered bottle may be used for four or five days), and add 1 teaspoonful of this milky stock solution to 2 gal. of the water to be purified in a pail or other receptacle. Stir thoroughly in order that the weak chlorin solution will come into contact with all of the bacteria, and allow to stand for 10 minutes. This will give approximately one-half part of free chlorin to a million parts of water, and will effectually destroy all typhoid and colon bacilli, or other dysentery-producing bacilli in the water. The water will be without taste or odor, and the trace of free chlorin added rapidly disappears."

Sewage disposal and treatment (*Mo. Bul. Carnegie Libr., Pittsburgh, 15 (1910), No. 9, pp. 488–521*).—This is a classified list of references to books and periodical literature on this subject appearing up to November, 1910. Numerous references to literature bearing on the agricultural use of sewage are given, especially under the head of "broad irrigation."

The Imhoff clarification tank, D. H. THOMSON (*Surveyor, 40 (1911), No. 1034, pp. 548–551*).—Tests of this method of sewage purification are reported with descriptions of the character of the products obtained, particularly the sludge. It is shown that the holding of the sludge in the tanks until thoroughly decomposed, as is done in this process, greatly reduces the volume and water content of the sludge, but improves its value as manure.

SOILS—FERTILIZERS.

Soils, E. RAMANN (*Bodenkunde. Berlin, 1911, 3. rev. ed., pp. XV+619, pls. 2, figs. 63*).—In this, the third revised edition of this work, the more important changes in the manner of treatment of the subject matter made necessary by recent advances in the science of soils are as follows:

(1) The subject of weathering of silicates is treated on the basis of hydraulic processes, and the action of acids, particularly carbon dioxid, is given secondary consideration; (2) the clearer understanding of colloids has led to a recasting of the sections relating to several weathering processes and to numerous other soil reactions and to soil absorption; (3) the decomposition of organic matter in soil is considered on a biological basis; (4) the position is taken that the study of soil physics, especially the relation of the soil to water, should be made the subject of renewed and long continued study; (5) the biology of the soil is given individual consideration for the first time and is treated as a new branch of soil science, giving promise of fruitful results; (6) soils are grouped in climatic provinces but the author has endeavored to give due consideration to former systems of classification.

The book is divided into six parts as follows: Soil formation, chemistry of soils, physics of soils, biology of soils, physiography of soils, and distribution of soils. A short section is devoted to soil surveying and soil maps.

Practical soil investigation, E. HEINE (*Die praktische Bodenuntersuchung. Berlin, 1911, pp. 162, figs. 25, chart 1; abs. in Wasser u. Abwasser, 4 (1911), No. 10, pp. 423, 424*).—This is the third volume of a so-called library of scientific practice published in Berlin, and is stated to be designed particularly for the practical man whose time is too limited for him to consult extensive books of reference on soil investigation. Particular attention is given to the geologic-agronomic relations of the soils of northern Germany, based on the results of

soil surveys which have been carried on since 1872. A list of apparatus and instructions for simple tests of soils are appended.

Soils in relation to geology and climate, H. I. JENSEN (*Dept. Agr. N. S. Wales, Sci. Bul. 1, 1911, pp. 3–30*).—"In this paper the soils of New South Wales have been classified and cross classified on a meteorological and geological basis. The results are based on the comparative study of over 2,300 analyses of farmers' soils and type soils.

"The compilation clearly shows that a soil survey can be made more satisfactorily by geological and physiographic work than by chemical analyses. The results obtained by analysis only confirm what one would expect from geological considerations. Soil mapping is therefore essentially the work of the geologist and physiographer, who at the same time has devoted attention to the origin of soils and the agricultural needs of the State, or whose work is interpreted by an expert in agriculture."

The author believes that the most effective way of aiding the farmer would be the establishment of an experiment station on each important soil type to determine the strength and quality of the soil by growing test crops.

The effect of soluble salts on the physical properties of soils, R. O. E. DAVIS (*U. S. Dept. Agr., Bur. Soils Bul. 82, pp. 38, pls. 6, figs. 21*).—In this study of the effect of soluble salts on the physical properties of soils determinations were first made of penetration by the method proposed by Cameron and Gallagher (E. S. R., 19, p. 818), but it was found "that while the penetration method is of value in determining the general curve and the optimum water content for a soil, it can not be relied upon to detect small differences in the physical properties of a soil due to the addition of small amounts of soluble salts."

Tests were therefore made of the effect of the salts upon the apparent specific gravity by weighing full of soil a vessel of known volume, determinations being also made of the percentage of moisture in the soil. The soils used were Cecil clay loam, Volusia silt loam, Norfolk sand, and Susquehanna clay. The salts added included potassium chlorid, carbonate, and bisulphate, calcium sulphate, monocalcium phosphate, phosphoric acid, and ammonium nitrate singly and in various combinations in amounts varying from 0.006 to 1.33 per cent. The results showed that the addition of the soluble salts brought about changes in volume.

To determine the effect of the salts upon the movement of moisture, measurements were made of capillary movement in soil in a tube which was maintained in a horizontal position to eliminate the effect of gravity. The tubes were of glass "1 in. in diameter, with a scale in millimeters pasted along their length. These tubes were connected by strong rubber tubing to brass elbows, the lower end of which dipped into water. The water supply was kept at constant level. In filling the tube the end was closed by a sheet of filter paper and the tubes filled to the same distance in each case and then tapped until the loose soil had subsided a determined number of centimeters (usually 5). The brass elbows were all filled with the same soil, rubbed up in a mortar with a rubber-tipped pestle, and as nearly as possible given the same packing in the tubes. The lower ends of the brass tubes were closed by perforated corks, with glass wool in the perforations and fine copper gauze over them. The ends were submerged in the water about 3 cm. and allowed to stand there for 24 hours before the soil columns in the glass tubes were attached."

Observations on the capillary movement of water in the tubes during 24 hours showed that this was influenced to varying degrees by the soluble salts, which were the same as in the specific gravity tests.

Measurements were made of the vapor pressure of two soils, a clay loam and a sand, treated with potassium carbonate and monocalcium phosphate. Portions of the soil with and without addition of the soluble salts were placed in weighing bottles and enough water added to bring the soil almost to saturation. "These bottles after weighing were left open and placed in ordinary glass fruit jars and the top screwed down tightly. Weighings were made again after two or three weeks. In almost every case tried it was found that the soil containing the salt had lost more weight than the soil without salt."

Observations were made with a microscope and lantern to obtain visual evidence of the difference in soil structure produced by the addition of soluble salts. The microscopic examinations were unsatisfactory and were abandoned. In using the lantern "the soil, placed in an ordinary Petrie dish, was moistened with water and then placed in a horizontal position on the condenser of the lantern. The lantern is so made that vessels containing specimens to be examined can be placed either in a vertical or horizontal position. The image of the soil particles was then thrown upon a screen or upon a photographic plate in a camera, if it was desired to preserve them. The water was then allowed to evaporate from the soil and the movement of the soil particles was noticed as the moisture content of the soil was reduced. . . . As the soil dried out, the particles could be seen to arrange themselves into groups, and the soil became much more open in structure. The same phenomenon was observed when salts were added, but in addition a difference is noted in the aggregation of the smallest particles present. When a clay or clay loam was used and the projection largely magnified, the small particles could be seen to be in almost continuous motion. . . . In the case of the calcium phosphate the small particles seem to collect in aggregates and these aggregates act as larger particles; with the potassium carbonate the small particles do not form aggregates by themselves, but appear to collect about the larger particles and to form aggregates with sand grains as centers."

The results as a whole, therefore, furnish evidence "that the addition of small amounts of soluble salts affect the physical properties, and therefore the structure of the soil. . . . The effect of salts is more pronounced in a soil containing a large percentage of fine soil particles, and this leads to the conclusion that colloidlike clay particles are affected most by soluble salts, and in turn affect most the structure of the soil."

The osmotic pressure of soils, J. König (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. XXIII–XXVI, fig. 1*).—The osmotic pressure of 6 different kinds of soil, fertilized and unfertilized, was determined by means of a special method and form of apparatus, using cylinders of the Pasteur-Chamberland filter prepared with a semipermeable coating as described in previous articles (E. S. R., 20, p. 713; 24, p. 521).

In the method adopted 15 gm. of soil was mixed with asbestos moistened with water and placed in the porcelain cylinder of the filter. The cylinder was then closed with a rubber stopper carrying a capillary tube filled with machine oil of specific gravity 0.9091. The whole apparatus was then placed in a large vessel of distilled water kept at constant temperature. After a short time the water passing through the semipermeable membrane increased the volume of the soil solution, forcing an equal volume of oil out of the capillary tube. This was collected in a graduated cylinder and weighed daily at the same hour. The quantity of oil displaced reduced to its water equivalent and calculated for 100 gm. of soil and unit of time (one day) was taken as a measure of the osmotic pressure of the soil.

In tests of unfertilized soils and soils fertilized with small amounts of potassium sulphate, superphosphate, and sodium nitrate it was found that osmose

was much larger for the fertilized soils and stood in close relation to the increase in production of dry matter by oats and peas grown on the soils except in case of a fertile clay soil. The author concludes, therefore, that studies of the osmotic properties of the soil may furnish a means of detecting even small amounts of plant food added to the soil.

Investigations on the water-carrying power (Wasserführung) of the soil, II. PUCHNER (*Internat. Mitt. Bodenk., 1 (1911), No. 2, pp. 99–137*).—It is explained that the water-carrying power (Wasserführung) of soils differs from water capacity as ordinarily understood in that it takes account of the capillary water, including hygroscopic water, and also the drainage water.

In order to obtain a measure of the maximum water-carrying power of soils determinations were made of the percentage by volume and weight of water retained by soils in loose and in puddled (gewachsenen) condition. The so-called puddled condition was obtained by wetting the soils to saturation, shaking until puddled, and allowing them to dry before proceeding with the determination of water-carrying power. In making this determination the soils were placed in tin cylinders provided with wire gauze bottoms covered with filter paper; the cylinders were allowed to stand in water until the soil was saturated, and then shaken until the soil was puddled, a certain amount of drainage water leaching out through the bottom. The gains in weight of the cylinder calculated in percentages of volume and weight were taken as a measure of the water-carrying power of the soils.

This method was used in the examination of a large number of typical Bavarian soils, the more important results of which were as follows: The water-carrying power of the soils was dependent upon other factors besides the size and arrangement of soil particles and the content of colloidal substances. The water-carrying power in percentage of volume was generally considerably larger for the puddled soils than for those in loose condition, whereas in percentage of weight it was often smaller for the puddled soil. The larger proportion of the mineral soils showed a higher water-carrying power in percentage of volume with the loose than for the puddled condition, except in the case of certain soils of peculiar texture, as for example, those rich in organic matter. The surface layer of soil generally, although not always, showed a higher water-carrying power than the lower layer. With the surface soil in loose condition and the subsoil in puddled condition the water-carrying power was higher in percentage of volume for the former, but in percentage of weight the reverse was true. Emphasis is placed upon the importance of study of questions of the relative proportion of capillary and drainage water of the soil, and it is believed that the centrifugal method of Briggs and McLane (E. S. R., 19, p. 416) gives the most promise for such determinations. In several trials with soils of varying composition it was found that the drainage water decreased with the clay and humus content and increased with the sand, and the finer the sand the greater the drainage.

A contribution to the subject of the hygroscopic moisture of soils, C. B. LIPMAN and L. T. SHARP (*Jour. Phys. Chem., 15 (1911), No. 8, pp. 709–722*).—In view of the confirmation by H. E. Patten and F. E. Gallagher of the Bureau of Soils of this Department (E. S. R., 19, pp. 1118) of the principle, enunciated by Knop and Schübler, "that the power of soils to absorb hygroscopic moisture from a saturated atmosphere decreases with a rise in temperature and increases with a decline in temperature," and the contrary conclusion by E. W. Hilgard "that not only does the power of soils to absorb hygroscopic moisture not decrease with a rise in temperature, but that it actually increases provided the atmosphere is saturated," the authors undertook not only to investigate further the relation of temperature to absorption of hygroscopic moisture by

soils but also to test the accuracy of the methods employed and the influence of other experimental conditions, particularly depth of the soil layer.

Air dried samples of adobe soil "were sifted through the 0.5 mm. sieve and distributed in duplicate in 1-gm., 3-gm., and 6-gm. portions in weighing bottles which were about $1\frac{3}{16}$ in. in diameter and $1\frac{15}{16}$ in. in height. They were arranged on a glass plate which was placed on a porcelain acid dish partly filled with distilled water and set in turn on a ground-glass plate, over the whole of which was fitted a bell jar of the short, squat form, to the inside upper portion of which was pasted a considerable quantity of thoroughly moistened filter paper. The ground rim of the bell jar was well covered with vaseline so as to permit of no escape of the moisture from the bell jar and thus insure a thoroughly saturated atmosphere. The apparatus was then placed on a shelf in a small room as far as possible from currents of air and where the temperature could be raised at will by lighting a Bunsen burner. A centigrade thermometer was placed next to the bell jar so that the temperature could be taken accurately just previous to removing the bottles from the jar for weighing. From the amounts of soil placed in the weighing bottles we had a depth in the case of the 1-gm. samples of 1.5 mm., in that of the 3-gm. samples of 4 mm., and in that of the 6-gm. samples of 8.5 mm. The covers of the weighing bottles were protected from moisture and dust under a separate bell jar and were so arranged on a glass plate as to allow of their being placed in their respective bottles in two or three seconds from the time when the jar in which the samples were exposed was raised from the ground glass plate, thus preventing any loss of moisture."

It was found that by using very thin layers of soil this method gave accurate results and it was, therefore, employed in a study of effects of variation in temperature. The more important conclusions reached from this study were that a layer as nearly as possible 1 mm. in depth gave the best results. "Hilgard's method for the determinations is recommended to be used as a standard in all soil work on hydroscopicity. A rise in temperature is accompanied by a greater absorption of hygroscopic moisture, a fall in temperature by a decreased absorption. These do not take place according to any definite law. For the arid regions in particular, the hygroscopic moisture in soils has a certain definite practical importance. Similar results on the effect of temperature on the absorption of hygroscopic moisture by soils are obtained in the incubator as in the room. The total absorptions in the incubator, however, as well as the variations with temperature are much smaller than in the room."

Contributions to the study of the mechanical analysis of soils and of the determination of outer soil surface by heat of wetting and hygroscopicity, K. Pfeiffer (*Beiträge zur Frage der mechanischen Bodenanalyse und der Bestimmung der Bodenoberfläche mittels Benetzungswärme und Hygroskopizität. Diss. Univ. Giessen, 1911, pp. 55, fig. 1; Landw. Jahrb., 41 (1911), No. 1, pp. 1–55*).—The author reviews in detail previous investigations on the physical properties of soils as determined by mechanical analysis by sieve and sedimentation, heat of wetting, and hygroscopicity, and reports the results of his own experiments in which he sought to compare the relative values of these three methods in so far as they give an insight into the physical properties of soils.

From the results of his studies the author concludes that the method of determining the surface area by heat of wetting does not commend itself for use not only on account of the complexity of the apparatus required and the decrease of surface area of the soil upon drying, but because the heat of wetting

is not dependent upon the surface area alone but is affected also by adhesion to the soil of the liquid used.

He holds that theoretically the hygroscopicity of a soil is a better measure of the outer surface than the heat of wetting but that to the present time no method of accurately determining the outer surface has been worked out. Hygroscopicity has not been shown to be a measure of the productivity of the soil, and in just as small a degree can the absorption of carbon tetrachlorid by the soil be taken as a measure of the ease of tilth. Nor is the difference between the hygroscopicity and absorption of carbon tetrachlorid an indication of the extent of decomposition and of the quantity of humus, because humus alone does not determine the relation between hygroscopicity and absorption for carbon tetrachlorid. The influence of drying in determining the hygroscopicity may be eliminated with some soils, but this can not be done in determining the absorption of soils for organic fluids.

The author expresses the opinion that the study of the mechanical analysis of soils by sieve and sedimentation should be vigorously prosecuted, and points out that it is entirely possible to classify mineral soils on the basis of their content of finer particles of an hydraulic value of <0.2 mm., using the microscope to determine the more important minerals, their degree of weathering, and their form. He believes that an adequate classification of fine soils would be one of two groups on the basis of current velocities of 0.02 and 7 mm., respectively. A division into three groups (current velocity for the third not given) should be the utmost required.

The importance of soil colloids in the determination of hygroscopicity in cultivated and forest soils, P. Ehrenberg and H. Pick (In *Festschrift Van Bemmelen, 1911, pp. 194–205; abs. in Geol. Zentbl., 16 (1911), No. 5, p. 228; Wasser u. Abwasser, 4 (1911), No. 9, pp. 373, 374*).—It is pointed out, as in previous papers (E. S. R., 24, p. 521), that drying soils previous to determining the hygroscopicity results in a lowering of the hygroscopicity due to the effect of the drying of soil colloids, particularly humus.

The plasticity of clays, A. Atterberg (*Internat. Mitt. Bodenk., 1 (1911), No. 1, pp. 10–43, figs. 3*).—This is substantially the same article as that previously noted (E. S. R., 25, p. 319).

The measurement of soil evaporation under arid conditions, C. H. Lee (*Engin. News, 66 (1911), No. 15, pp. 428–432, figs. 7*).—This article reports the results of experiments to determine the annual evaporation from soils for varying depths of the water level. The observations were conducted in Owens Valley, Cal., the geologic structure of which "is also typical of that of the Great Basin, being a deep synclinal trough partially filled with alluvial débris from the adjacent mountain ranges." The conditions of the experiment were those of an arid climate, a clay soil with vigorous growth of salt and fresh water grasses, and a permanent ground water surface from 3 to 8 ft. below the ground surface.

"The experimental equipment consists of two galvanized iron tanks, $6\frac{1}{2}$ ft. in depth, connected at the bottom by an 18-ft. length of galvanized pipe. The smaller tank is 2 ft. $4\frac{3}{16}$ in. in diameter and is furnished with a tight fitting cover. The larger tank is 7 ft. $5\frac{1}{4}$ in. in diameter and has a system of branching perforated pipes at the bottom connected with the pipe from the smaller tank. The two tanks and all connections are water tight, and water poured into the smaller, or reservoir tank, passes through into the larger, or soil tank, and escapes through the perforations.

"These two tanks were placed in excavations of a proper size to receive them, the soil tank filled with the excavated soil, and the reservoir tank filled with water. A 6-in. layer of screened gravel, too coarse to enter the $\frac{1}{16}$-in. per-

forations, was laid in the bottom of the soil tank to insure an uninterrupted and well distributed feeding of water from the reservoir tank into the superimposed soil. As soon as the material became saturated and capillary action established to the surface, the water level in the soil was brought to the desired depth and kept there by supplying water to the reservoir tank in measured quantities. Volumetric measurements of water poured into or withdrawn from the reservoir tank were made with an ordinary gallon measure. Accumulation or depletion of the supply in the reservoir tank was determined volumetrically by measuring the depth of water with a steel tape. The volume passing out of the reservoir tank during a given period represents the total evaporation from the soil tank during that period."

From the results of these studies the author concludes that the relation between soil evaporation under arid conditions and ground water fluctuation is one of cause and effect. The dates of maxima for the one correspond to the dates of minima for the other.

It is suggested therefore that the dissipation of ground water into the atmosphere can be prevented "by providing some means by which the surface of saturation can be kept at or below the limiting depth at which soil evaporation will occur. The loss will then cease, and the means by which it is accomplished, whether by pumped wells or deep drainage ditches, will deliver an equivalent volume of water that can be put to beneficial use. The concentration of alkali in the upper soil layers which usually accompanies rising ground waters would also be under control and the drained land fitted for agricultural purposes. There is yet much to be done in this direction before complete use can be made of the available water supply of the Western States."

A new method of physical analysis of the soil, J. DUMONT (*Compt. Rend. Acad. Sci.* [*Paris*], *153* (*1911*), *No. 19, pp. 889–891; abs. in Rev. Sci.* [*Paris*], *49* (*1911*), *II, No. 21, p. 669*).—In a previous article (E. S. R., 23, p. 715) the author showed that the sand particles obtained by ordinary methods of elutriation were in many cases covered with a humus clay coating of complex composition which in strong, compact soils is sufficiently large to vitiate the results of analysis. In this article he proposes removing this coating before mechanical analysis by treatment of the fine earth with oxalic acid.

The complete method of analysis which he proposes consists of the following operations: (1) The determination of lime and the cleaning of the fine earth particles by means of oxalic acid; (2) solution of humus compounds and separation of sand by sedimentation; (3) separation of clay compounds and colloids by centifuging; (4) determination of mineral colloids and humus compounds. By this method a complete separation of all the essential constituents of soils may be made with great accuracy in a half day. The method also secures the most perfect separation possible of clay, claylike substances, and mineral colloids.

The soil survey, A. R. WHITSON (*Rpt. State Conserv. Com. Wis., 1911, pp. 51–59*).—This article describes briefly the plan and purpose of the soil survey work recently provided for by the Wisconsin legislature and which is to be carried on in cooperation with the Bureau of Soils of this Department. Attention is called particularly to the value of such surveys as indicating the supply of plant food, extent of erosion, possibilities in the development of marsh lands, and the maintenance and increase of soil fertility.

Collecting and testing soil samples, C. G. HOPKINS and J. H. PETTIT (*Illinois Sta. Circ. 150, pp. 4*).—Brief, plain directions are given in this circular for taking samples of soil and making simple tests for acidity and carbonates.

Descriptions of soil types established and changes in classification since the publication of Bulletin 78 (*U. S. Dept. Agr., Bur. Soils* [*Pub.*], *1911, Nov.*

6, *pp. 28*).—The changes made since January 1, 1910, in the classification of the soils of the United States are given, and the new types established in different soil provinces are described.

Soils of the Eastern United States and their use, XXIV, XXV, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circs. 47, 48, pp. 15 each*).—These circulars deal respectively with the following soil types, as surveyed and mapped by the Bureau of Soils:

Circular 47.—The Orangeburg Sandy Loam, of which a total of 507,648 acres in 28 different areas in 7 States has been surveyed and mapped.

The surface soil is a gray or brown sandy loam of variable texture, grading into a red, sandy clay, and at greater depths into a stiff red clay. This type is particularly well suited to the production of Upland cotton and is also a fair corn and winter oat soil. "Increasing areas of the type are being planted to peaches, chiefly the Elberta. The fruit produced is of good quality, and the trees when located upon properly selected sites are long-lived and thrifty."

Circular 48.—The Orangeburg Fine Sand, of which a total of 475,008 acres in 18 different areas in 6 States has been surveyed and mapped.

The surface soil of 15 in. or more is a gray or brown fine sand, or occasionally a fine sandy loam, grading into a sticky red fine sandy loam which at a greater depth becomes sandy clay. The topography is rolling or somewhat hilly and, together with the sandy texture of the soil, affords good drainage. "The type is subject to excessive erosion in some areas, particularly where the upland portions break down with sharp slopes toward the major stream drainages. The Orangeburg fine sand is a fair cotton soil. It is not so well suited to the production of corn and winter oats, which, with cotton, constitute the staple crops. . . . The Cuban cigar filler tobacco is the most important special crop adapted to this type. For improvement in soil efficiency the first need is the restoration of organic matter to the surface soil."

The soils of Sullivan County, R. C. DONEGHUE ET AL. (*Missouri Sta. Bul. 92, pp. 453–486, pl. 1*).—This bulletin contains a report of a soil survey, including a soil map of Sullivan County, Missouri, describing the natural features, agriculture, and soil types of the region. Mechanical analyses of the different soil types are included.

The soils of the county are all of glacial and alluvial origin and are grouped broadly as upland and lowland soils. The following types are described and mapped: Shelby loam, Putnam silt loam (3 phases), Wabash silt loam, Wabash clay loam, and stream wash. The Shelby loam, which is the principal type of the area, is considered "well suited to general farming."

The soils of Audrain County, R. C. DONEGHUE and B. W. TILLMAN (*Missouri Sta. Bul. 93, pp. 491–514, pl. 1*).—Data similar to the above are presented for Audrain County.

"The soils are of three principal kinds—glacial, residual, and alluvial. Of these the upland prairie silt loam of glacial origin is much the most important, both on account of its extent and also its productiveness." The soil types described and mapped are Putnam silt loam, Shelby loam, rough stony land, Leslie clay, Waverly silt loam, and Waverly sandy loam. The most extensive of these types is the Putnam silt loam.

Report on soils, etc., in Central Park, New York City, G. B. MAYNADIER ([*New York, 1911*], *pp. 30*).—Pursuant to a report setting forth the unfavorable soil conditions existing in Central Park, New York City, the author was authorized to undertake a study of this soil with a view of determining its quality and adaptability for lawns. The mechanical and chemical analyses reported were made in the laboratory of the Bureau of Soils of this Department.

The results showed that this soil was well fitted for lawns as regards texture and mineral plant food and that, therefore, resoiling as previously recommended was unnecessary. Amelioration of the unfavorable conditions must be brought about by more careful management, including the eradication of weeds and undesirable plants, the rational application of stable manure and mineral fertilizers, and the construction of a more adequate system of surface and under drainage.

Dune areas of New Zealand, L. COCKAYNE (*Wellington, New Zeal.: Dept. of Lands, 1911, pp. 76, pls. 28*).—This is a continuation report on the sand dunes of New Zealand and, in addition to enlarging the previous report on their geology and botany (E. S. R., 24, p. 420), deals particularly and in detail with methods of reclaiming these dunes.

The author recommends the inauguration of carefully planned experiments to test the feasibility of afforestation. Planting of marram-grass, but not of tree-lupin, should be encouraged in his opinion, and fencing in of such areas is considered unnecessary in most cases. Trees, on the other hand, if planted should be fenced in.

A bibliography of the literature on the subject is appended.

Earthworms and small animals in the German forest soil, E. RAMANN (*Internat. Mitt. Bodenk., 1 (1911), No. 2, pp. 138–164*).—The author reports the results of examinations of a large number of soil types from different forests of Germany to determine the kind and number of animal organisms in the soils and their relation to soil formation, flora, and climate. In general he found that the activity of the animal life was much more pronounced for loam than for sandy soils, and increased also with an adequate water content. The influence of animal life on humus formation and mechanical condition of the soil is emphasized, although no definite relation could be established from the investigation reported.

Observations on the improvement of alkali soils, A. A. J. VON SIGMOND (*Internat. Mitt. Bodenk., 1 (1911), No. 1, pp. 44–66, dgms. 2*).—This is a continuation of investigations on the alkali soils of Hungary (E. S. R., 23, p. 415).

The author divides the soils into two main groups, (1) the so-called characteristic alkali and (2) the soda soils. The former are subdivided into productive and steppe or meadow soils and these again into minor divisions. The soda soils are divided into clay, loam, and sand types.

The different layers distinguished in the alkali soils were (1) an ash-colored humus clay, (2) a brown transition layer, (3) a loamy marl with lime concretions, and (4) a blue clay (impervious). The soda soils had no distinct layers, but typical of them was a layer of sand at a depth of about 6 ft. which contained an impervious layer of lime (hardpan), wherever it was covered with a surface layer of sand or a shallow layer (about 18 in.) of a salt-saturated loam. These lime banks (hardpan) were not formed where there was a surface layer of clay (about 4½ ft.).

Both the so-called alkali and soda soils formed, or had a tendency to form, crusts, but of a widely different nature. The soda soils during dry seasons often formed a pure salt conglomerate consisting of soda, sodium chlorid, and small amounts of other soluble salts. They were soluble in water, gave an alkaline reaction, and were moist to the touch in dry seasons. The crusts of the alkali soils were insoluble in water, even absorbed water very slowly, and the water-soluble parts often amounted to only 0.1 to 0.2 per cent.

The results of experiments in the improvement of these soils are briefly reviewed, showing that an application of marl and unrotted stable manure and thorough draining will greatly improve the condition of the so-called productive

soils. The improvement of the steppe, or meadow soils, should be based on their salt content and includes the selection of adapted plants, the rational use of fertilizers, and irrigation. The production of fish is recommended for those areas where irrigation is impossible. No experiments were made on the soda soils, but the author is of the opinion that nothing but a thorough washing out of the salts will benefit them, and he doubts whether even such treatment will be of lasting benefit on account of the rapid capillary rise of the salts.

Alkali work, P. B. KENNEDY ET AL. (*Rpt. Lincoln Co. [Nev.] Expt. Farm, 1909–10, pp. 49–51*).—In order to obtain accurate data regarding the action of alkali in soil irrigated for the first time, eighth-acre plats on the Lincoln County Experiment Farm in southern Nevada were irrigated (1) by flushing, (2) by the check system, and (3) by furrow irrigation, and analyses were made of the water before and after irrigation.

The alkali, which consisted mainly of sodium sulphate and chlorid, with small amounts of carbonate, was largely concentrated in the first foot of soil. The largest amount of alkali was removed by flushing the water as rapidly as possible over the land. By check irrigation the alkali was carried down into the soil but not removed. Only a small part of the alkali was removed by furrow irrigation, but this method was found to be useful on uneven land.

Experiments on the accumulation of green manure nitrogen in light sandy soils, C. VON SEELHORST (*Mitt. Deut. Landw. Gesell., 25 (1910), Nos. 20, pp. 291, 292; 21, pp. 309–311; 26 (1911), Nos. 45, pp. 619–622; 46, pp. 630–632; 47, pp. 645–647*).—This is an account of a continuation of experiments with large vegetation tanks previously described (E. S. R., 22, p. 122). The principal conclusions from this series of experiments to date are as follows:

The loss of total nitrogen was much smaller from the cereal tanks than from the potato tanks. This has resulted not from smaller utilization of nitrogen by the cereals but from a smaller loss of nitrogen in the drainage of the cereal tanks. The nitrogen loss in the drainage water was in all cases much greater with fall green manuring than with spring green manuring. The nitrogen recovered in the crop was in all cases greater with spring green manuring. The total nitrogen in crop and drainage water showed small variations in the series of potato experiments, but no variations in case of the cereal experiments. In the potato experiments the total loss of nitrogen from the soil was smaller with spring green manuring than with fall green manuring. In the latter case the loss of nitrogen in the drainage water was so great that it was not overbalanced by the greater recovery of nitrogen in the crop with spring green manuring. The loss of nitrogen during 6 years was the same from the tank cropped continuously without green manure and from that kept bare, but in the first case four-sevenths of the nitrogen removed was in the crop.

Organic compounds and fertilizer action, O. SCHREINER and J. J. SKINNER (*U. S. Dept. Agr., Bur. Soils Bul. 77, pp. 31, pls. 2, figs. 5*).—This bulletin reports water culture and pot experiments to determine the effect of cumarin, vanillin, and quinone on the growth of wheat seedlings when used alone and with various combinations of monocalcium phosphate, sodium nitrate, and potassium sulphate.

The toxic effects of the substances were shown by decrease in weight of green matter produced, an abnormal and unhealthy appearance of the plants, and a decreased absorption of plant nutrients. The three substances showed a markedly different behavior in detail, although producing the same general effect. "The various fertilizer salts acted differently in overcoming the respective harmful effects of these toxic compounds. The mainly phosphatic fertilizers were the most efficient in overcoming the cumarin effects; the mainly

nitrogenous fertilizers in overcoming the vanillin effects; the mainly potassic in overcoming the quinone effects."

Catalytic fertilizers for sugar beets, J. STOKLASA (*Bl. Zuckerrübenbau, 18 (1911), No. 11, pp. 193–197; abs. in Chem. Ztg., 35 (1911), No. 86, Repert., p. 361*).—The yield of sugar beets was increased from 30 to 50 per cent by adding 9 kg. (19.8 lbs.) of manganese and 4.48 kg. (9.8 lbs.) of aluminum per hectare in form of the sulphates to a complete basal fertilizer. The assimilable aluminum salt apparently corrected the toxic action and promoted the stimulating effect of the manganese salt. Lead nitrate, which is found in small amounts in Norwegian calcium nitrate, increased the yield from 30 to 40 per cent and the sugar content 1 per cent when used at the rate of 0.9775 per cent, but began to depress the yield but not the sugar content when used at the rate of 1.855 per cent. Beneficial effects of lead nitrate were also observed in case of oats, corn, and other crops.

Arsenic, which is generally present in superphosphates to the extent of 0.01 per cent, was found to exert a stimulating effect on sugar beets when used in amounts not exceeding 0.4 per cent in the form of either arsenious or arsenic acid. Arsenic trioxid and pentoxid are more toxic.

The author holds that manganese, aluminum, zinc, copper, and like substances are catalytic agents, performing an important function in carbon assimilation by promoting rapid photosynthesis in the chlorophyll apparatus.

Analyses and valuations of commercial fertilizers, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 240, pp. 3–49*).—Analysis of 591 samples of fertilizing materials, including factory mixed and home mixed fertilizers, and miscellaneous unmixed materials examined during 1911, are reported.

Special attention is called to the fact that this bulletin reports in addition to nitrogen as nitrates, ammonia, and organic matter "the water-soluble organic nitrogen, the active insoluble organic nitrogen, and the inactive insoluble organic nitrogen.

"The 'water-soluble organic nitrogen' includes all of the organic nitrogen which is soluble in water and is probably of high availability. Many of the standard ammoniates contain a small amount of organic nitrogen that is soluble in water, but, in mixed goods, when a large proportion is water-soluble, it probably results from the treatment of the material with acid during the process of manufacturing the fertilizer.

"The 'active insoluble organic nitrogen' includes that portion of the nitrogen in the residue remaining after the water-soluble portion as been removed, which is liberated by the method adopted by the stations . . . known as 'the alkaline permanganate method.' A very large proportion of the organic nitrogen in standard ammoniates is not soluble in water, but it is well known that they are highly available to plants after they have decomposed in the soil. The determination of the 'active insoluble organic nitrogen' is intended to show the quantity of the insoluble nitrogen that will thus become available to the plants.

"The 'inactive insoluble organic nitrogen' is that part of the insoluble nitrogen which is not liberated during the prescribed treatment. It is not claimed that this form of nitrogen will not become available after a considerable time but that it is actually inactive and on account of this condition should be considered as having but little value as quick-acting nitrogen."

The object of these additional determinations is to furnish a more accurate means of judging of the availability of the nitrogen of mixed fertilizers. "In estimating the availability of the total nitrogen content in a fertilizer, it must be remembered that the total availability is not determined by the availability of the insoluble nitrogen alone but that it must be judged by all of the various

forms. The nitrogen from nitrates, from ammonia salts, and probably the water-soluble organic nitrogen, is highly available, while the character of the insoluble nitrogen is shown by the relative percentages found for the 'active' and 'inactive' insoluble nitrogen."

A schedule of trade values adopted for the New England States and New Jersey for 1911 is given.

Further investigations on the hygroscopicity of certain new nitrogenous fertilizers, H. VON FEILITZEN and I. LUGNER (*Chem. Ztg., 35 (1911), No. 108, pp. 985, 986, figs. 2.*)—See a previous note (E. S. R., 25, p. 727).

The influence of calcium carbonate on the transformation of ammoniacal and nitrate nitrogen, J. VOGEL (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1911), No. 5, pp. 330–350; abs. in Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 6–12, p. 261*).—Previous experiments having indicated that ammoniacal and nitrate nitrogen do not behave alike in soils and in culture solutions (E. S. R., 24, p. 221), further investigations were made which showed that, while an appreciable amount of organic nitrogen was formed from ammoniacal and nitrate nitrogen in culture solutions, there was no such fixation of nitrogen in the soil experiments.

The addition of calcium carbonate promoted to a marked extent the fixation of the ammoniacal nitrogen in the culture solutions but did not produce such a result in soils containing a normal supply of moisture. When calcium carbonate and ammonium salts were applied to the soil together, there was an appreciable loss of nitrogen, which is attributed not only to escape of ammonia but also to transformation of the ammonia into nitrate from which, under the conditions of these experiments, there was a loss of nitrogen through dentification. It is thought, however, that the conditions of the experiment were abnormal in that the soils experimented with were kept in Erlenmeyer flasks and insufficiently supplied with air.

The occurrence of potassium nitrate in western America, R. STEWART (*Jour. Amer. Chem. Soc., 33 (1911), No. 12, pp. 1952–1954*).—Analyses of samples of crude nitrate obtained from a small cave in a sandstone formation in southern Idaho are reported with a brief suggestion as to the possible origin of the nitrate

Action of manganese sulphate on vegetation, G. MASONI (*Staz. Sper. Agr. Ital., 44 (1911), No. 2, pp. 85–112; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 587, II, p. 821*).—In pot experiments with corn and lupines in which manganese and iron sulphates, separately and in combination, and sodium sulphate were applied to the soil, it was found that the addition of small amounts of manganese sulphate reduced the yield of dry matter of corn considerably. With the largest amount of manganese sulphate (Mn=0.005 per cent), in addition to iron sulphate, there was a slightly increased production of dry matter. With iron sulphate alone, there was also an increase in dry matter. Sodium sulphate did not materially increase the production of dry matter, but greatly increased the amounts of manganese and iron taken up from the soil.

Manganese sulphate alone (Mn=0.001 per cent) increased both the dry matter and the percentage of manganese in the dry matter of lupines. Manganese sulphate (Mn=0.005 per cent) with iron sulphate produced the largest amount of dry matter in lupines. Sodium sulphate also gave an increase in dry matter and an increase of manganese, but not of iron taken up from the soil.

The general conclusion is that manganese sulphate is injurious rather than beneficial, or if beneficial this effect is probably due to the acid portion of the salt. Its physiological action is diminished by the presence of iron.

AGRICULTURAL BOTANY.

A text-book of botany, E. STRASBURGER ET AL. (*Lehrbuch der Botanik für Hochschulen. Jena, 1911, 11. ed., enl., pp. VIII+646, figs. 780*).—This is the eleventh edition of the well-known Bonn text-book of botany, in which some changes have been made and much of the material has been rewritten. The general arrangement and treatment of the subject has been retained, the authors believing that their experience with former editions has justified the maintenance of the original plan.

Report of the department of botanical research, D. T. MACDOUGAL (*Carnegie Inst. Washington Year Book, 9 (1910), pp. 55–66*).—This report gives a record of the investigations in progress at the desert laboratory at Tucson, Ariz.

The investigations on parasitism of plants, root habits of desert plants, and water balance of succulents have been completed. The principal investigations in progress at present are on the climatology of American deserts, condition of parasitism, acclimatization studies, alterations in heredity introduced by ovarial treatment, and studies on the germination and establishment of desert perennials.

Sudden variations in plants and animals, L. BLARINGHEM (*Les Transformations Brusques des Êtres Vivants. Paris, 1911, pp. 353, figs. 49*).—This book is intended as a contribution to the mutation theory of De Vries. The author places on record a number of mutations among plants and animals that are said to be even more conclusive than those of *Œnothera lamarckiana*, which have been so extensively studied and described.

Problems of the biochemistry of respiration in plants, F. F. BLACKMAN ET AL. (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 762–765*).—This article consists of a synopsis of discussions before the joint sections of chemistry and botany, in which a discussion was had on the biochemistry of respiration, the constitution and function of oxidases, and degenerative enzyms in the plant.

The effect of chloroform upon respiration and assimilation, ANNIE A. IRVING (*Ann. Bot. [London], 25 (1911), No. 100, pp. 1077–1099, figs. 24*).—Experiments are reported with young barley shoots and leaves of cherry laurel to determine the effect of single doses of chloroform on respiration, the effect of continuous treatment with chloroform, and its effect on assimilation.

There was found to be a regular progression between the augmentative effect of minute doses and the inhibitory effect of large quantities. Small doses of chloroform increased respiration, and this effect could be maintained if chloroform was given continuously. If chloroform was withdrawn respiration reverted to normal condition. Medium large doses of chloroform caused an initial acceleration of carbon dioxid, followed by a decline in its production to below normal. Strong doses of chloroform did not result in any increase of carbon dioxid production, but it rapidly fell to zero.

The results with single doses of chloroform and continuous applications are comparable in that the initial stages of action of the vapor are most significant, and when these changes are once set going the final stages run their course whether the vapor is still being applied or has been stopped.

In studying the effect of chloroform on assimilation minute doses of chloroform were found without effect in the dark, although they arrested assimilation in lighted leaves. If chloroform was given for a short period at a very low concentration it was found that the leaves could partially recover their assimilative power upon removal, but if moderate or large doses were used the assimilative power was destroyed.

Electromotive phenomena in plants, A. D. WALLER (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 281–288, figs. 5*).—In a previous report (E. S. R., 21, p. 317)

an account is given of investigations by the committee of the British Association on electrical phenomena and metabolism in some plants. These investigations have been continued, and in the present paper a report is given on the rate of action of drugs upon muscle and the rate of change taking place in laurel leaves.

As a result of the studies it was found that the action of chloroform on the leaves of the cherry laurel abolishes the electrical response within a period of 5 minutes. Coincidental with the abolition of the electrical response the evolution of hydrocyanic acid commences, and this continues for many hours after the death of the leaf. The rate of evolution of hydrocyanic acid by laurel leaves is closely related to the temperature at which it takes place. The author states that a method has been elaborated by which it is possible to measure the output of hydrocyanic acid from laurel leaves for a period of one minute, and that the method is applicable quantitatively as well as qualitatively to any vegetable or animal tissue.

On the blaze currents of laurel leaves in relation to their evolution of prussic acid, MRS. A. M. WALLER (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 288–290*).—The presence of the blaze current is held to be a sign that the plant or animal tissue is living, and young laurel leaves exhibiting these currents did not give off any hydrocyanic acid, as shown by discoloration of picrate of soda test papers.

A series of investigations on the types of blaze currents by the Waller method (E. S. R., 13, p. 461) was made, and it was found that a one-minute immersion in chloroform at a temperature of 40° C. did not abolish the blaze current or start the evolution of hydrocyanic acid. It was only after several minutes, usually about 4, that the leaf gave no blaze current, and tests indicated the presence of hydrocyanic acid. It was found that there was a double process at work in all tissues, viz, polarization effect and the blaze. The blaze current can be abolished by anesthetics, but the polarization can not be.

A study was made of yellow laurel leaves on the supposition that such leaves were dying, but they were not found to give off hydrocyanic acid as long as the blaze current was indicated.

The relation of hydrocyanic acid to maturity of the bitter and sweet almond, G. DE PLATO (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 4 (1910), pp. 117–127*).—The author reports on 2 forms of hydrocyanic acid in almond seed, one which he calls semi-free and the other combined hydrocyanic acid.

The semi-free hydrocyanic acid in the seed of the bitter almond diminishes with the ripening of the seed and is completely absent when the seed is fully matured. The combined hydrocyanic acid, on the other hand, increases with the development of the cotyledons, but begins to diminish with their hardening, and upon maturity it is almost entirely wanting. The semi-free hydrocyanic acid and the glucosid in the sweet almond decrease with the formation and hardening of the cotyledons. At the time of maturity of the almond the fixed nitrogen has increased to 97.24 per cent of the total nitrogen, a condition the reverse of that present in the germination of seed when the development of the young organs of the plant require the transformation of the albuminoids.

In the mature bitter almond protein and amygdalin are found, the latter evidently being an intermediate product of the formation of proteids. In the sweet almond the metabolism is more active, and amygdalin does not persist.

The presence of hydrocyanic acid in fungi, J. OFFNER (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 3, pp. 342–345*).—By means of sodium picrate paper an examination has been made of a large number of mushrooms for the presence of hydrocyanic acid. This substance has been recognized in only 2 species, *Marasmius oreades* and *Clitocybe infundibuliformis*.

The paths of translocation of sugars from green leaves, S. MANGHAM (*Rpt. Brit. Assoc. Adv. Sci., 1910, p. 785*).—This is an abstract of a report on investigations carried on to determine the path taken by sugars during translocation from the leaves, an account of which has been previously noted (E. S. R., 24, p. 718).

The author finds that the sugars move principally through the sieve tubes, and the results obtained indicate that there is a periodicity in the translocation of sugars. This point is undergoing further observation.

Concerning phyllohämin, II, L. MARCHLEWSKI and J. ROBEL (*Biochem. Ztschr., 34 (1911), No. 3–4, pp. 275–279, pl. 1, fig. 1*).—In continuation of work begun by the senior author on the constitution of chlorophyll (E. S. R., 20, p. 1026) a description is given of the physical and optical characters of phyllohämin.

A research into the amyloclastic secretory capacities of the embryo and aleurone layer of Hordeum with special reference to the question of the vitality and auto-depletion of the endosperm, II, F. STOWARD (*Ann. Bot. [London], 25 (1911), No. 100, pp. 1147–1204*).—In a previous publication (E. S. R., 25, p. 730) an account is given of methods for eliminating the influence of the aleurone layer, and in the present paper an account is given of experiments in which it is completely suppressed.

An attempt has been made to measure the amyloclastic capacities of the embryo, aleurone layer, and inner endosperm, and among the results obtained the author found that endospermic depletion as it occurs in the intact seed is principally due to the action of enzyms secreted by the aleurone layer and embryo; in the isolated endosperm, by the aleurone layer secretions; and in both cases, the principal rôle is due to the aleurone layer. The amyloclastic enzyms secreted by the embryo and aleurone layers are identical and are distinct from those present or generated by the inner endosperm.

Note on the action of strychnin upon some somatic cells, HELEN P. KEMP (*Ann. Bot. [London], 25 (1911), No. 100, pp. 1069–1076*).—Some experiments with strychnin are described in which the author undertook to examine the mitoses described by Hertwig.

She found that the somatic tissues of the pea and bean when treated with sulphate and hydrochlorid of strychnin showed no evidence of the figures described. In a series of experiments in water culture, peas were grown to determine the absorption of strychnin and the entry of the poison into the root cells. The presence of strychnin in the cells was demonstrated, and corelatively its absorption by the roots.

The results indicate that strychnin exercises no specific effect upon the tissues used in the experiments. There was no definite physiological response attributed to the presence of strychnin, except when used in sufficient strength to produce a general disturbance of metabolism.

The effect of polyurates and hippuric acid on the development of the radish, M. MOLLIARD (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 20, pp. 958–960*).—Experiments are reported in which radishes were grown in nutrient solutions to which various compounds were added, and comparisons were made with those grown in solutions to which were added nitrate of soda, ammonium chlorid, glycocoll, urea, sodium urate, allantoin, etc. Of the urea products, sodium urate and allantoin gave the greatest growth, and sodium urate increased the development of the fleshy roots and at the same time the total ash.

Impurities in the atmosphere of towns and their effects upon vegetation, A. G. RUSTON and C. CROWTHER (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 577, 578*).—A summary is given of investigations on atmospheric impurities in dif-

ferent parts of the city of Leeds, comparisons being made with other regions representing country and residential conditions (E. S. R., 25, p. 434).

Three years' experiments have shown the influence of acid waters and other impurities on the growth of grass. It was found that the high amounts of suspended matter in town air are directly injurious to vegetation by blocking the stomata of the leaves. In addition, it exercises a considerable influence by reducing the amount and intensity of solar radiation. Leaves were found to have as much as 80 per cent of their stomata completely closed by the matter suspended in the air. The relatively high acidity in the air as shown by rain water is decidedly injurious to vegetation, but the injury is to a considerable extent considered indirect on account of the effect of the acid on the micro-organisms in the soil. The reduced yield, lower protein content, and increased fiber content of grass grown under acid conditions are said to be matters of serious importance for farmers in semi-urban districts.

The influence of tobacco smoke on plants, H. MOLISCH (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 120 (1911), I, No. 1–2, pp. 3–30, pls. 2*).—A detailed account is given of investigations on the effect of tobacco smoke on plants, a partial report on which has been given elsewhere (E. S. R., 25, p. 225).

In the present paper the effect of tobacco smoke on seedlings of various kinds, as well as on several species of micro-organisms, is described. In the case of the micro-organisms they appear less subject to injury than pea, bean, and cucurbit seedlings.

The influence of tobacco smoke on plants (*Rev. Gén. Sci., 22 (1911), No. 21, pp. 823, 824*).—An abstract is given of a report on investigations carried on by Molisch in continuation of those reported above.

In the present paper an account is given of his investigations with various kinds of matured plants. These were found to react differently toward tobacco smoke, some being much more susceptible than others. In the case of *Bœhmeria utilis* it was found that the leaves of this plant when subjected to the action of tobacco smoke declined from the horizontal position, until within 24 to 48 hours they were nearly parallel to the stem. The same movements, although in a less degree, were observed in other plants.

In a second series of experiments it was found that an abnormal production of lenticels took place under the action of tobacco smoke, and in some plants the formation of the lenticels was accompanied by an exudation of gum. In experiments with a number of perennial plants the author found that tobacco smoke caused a fall of the leaves somewhat similar to that caused by illuminating gas. In the case of some ornamental plants the formation of anthocyanin was prevented.

FIELD CROPS.

[Variety and manurial tests with cereals and root crops], 1910, P. H. FOULKES, G. BALFOUR, and J. C. RUSHTON (*Field Expts. Harper-Adams Agr. Col., and Staffordshire and Shropshire Rpt. 1910, pp. 1–27, 45, 46, 56–68, pl. 1*).—The work reported is mainly a continuation of that already noted (E. S. R., 24, p. 728).

In a test of 11 different fertilizer applications for meadows the highest net profits for the 4 years 1907–1910 followed the use of 2½ cwt. superphosphate alone and with ⅓ cwt. sulphate of potash or 1½ cwt., nitrate of soda per acre. The highest net profits for the entire 8 years of this test followed the application of (1) 2½ cwt. superphosphate and ⅓ cwt. sulphate of potash, (2) 2½ cwt. superphosphate, and (3) 2½ cwt. superphosphate, ⅓ cwt. sulphate of potash and 1½ cwt. nitrate of soda.

Botanical analysis of the herbage of various plats showed that grasses were predominant on the check plat and formed the lowest proportions of the herbage on the plats fertilized with (1) superphosphate and sulphate of potash, and (2) nitrate of soda, superphosphate and sulphate of potash. Weeds showed the highest and lowest relative frequency on (1) nitrate of soda, and (2) superphosphate and sulphate of potash plats, respectively, while clovers were least frequent, relatively, on the nitrate of soda plats and most frequent on the superphosphate and sulphate of potash plat.

The greatest proportionate crop increases as compared with the check plat yields were secured from plats fertilized with (1) complete commercial fertilizer and farmyard manure, and (2) complete commercial fertilizer. By the end of the first 4-year period of the test the dressing of farmyard manure appeared to have been practically exhausted. Nitrate of soda alone or in combination with sulphate of potash failed to give commensurate return on this soil, the principal requirement of which appeared to be phosphates.

In a test of 4 fertilizers or fertilizer mixtures on meadow land during 1909–10 the highest average yield followed applications of (1) superphosphate and lime nitrate, and (2) potassic superphosphate. In a test of 6 kinds of grass seeds or grass-seed mixtures, the highest average 3-year yields followed the use of mixtures of (1) Italian rye grass, perennial rye grass, red clover, cow grass, white clover, and alsike, and (2) Italian rye grass, red clover, alsike, and trefoil.

In a test of 8 different fertilizers, an application of 550 lbs. of superphosphate produced 1 bu. more barley in 1910 than did 4 cwt. of potassic superphosphate, at the same expense. During the 2 years 1909 and 1910, applications of 4 cwt. of potassic superphosphate with 84 lbs. sulphate of ammonia, 130 lbs. nitrate of lime, or 112 lbs. nitrate of soda, supplying the same amounts of nitrogen, were followed by average barley yields of 53¼, 52, and 49⅛ bu. per acre respectively, but the highest values of produce are reported in connection with the nitrate of soda mixture. In value the yields of these applications were surpassed by the use of mixtures of kainit, superphosphate, and sulphate of ammonia.

In a test of 4 rates of seeding oats ranging from 160 to 280 lbs. per acre, the yield of grain was highest after the heaviest seeding but the net return was greatest after sowing at the rate of 200 lbs. per acre.

In a test of 18 fertilizers or fertilizer mixtures for mangels, the greatest average 4-year increases in yield followed the use of (1) 3 cwt. nitrate of soda and 1 cwt. of superphosphate, and (2) 2 cwt. nitrate of soda and 2 cwt. superphosphate. From the use of 6 cwt. potassic superphosphate, 8 cwt. basic slag, and 7¾ cwt. superphosphate, at approximately the same cost per acre and each in conjunction with 15 tons of farmyard manure, the average 3-year yields of mangles secured were 36 tons 13 cwt., 38 tons 12 cwt., and 37 tons 16 cwt., respectively.

In a test of nitrogenous fertilizer mixtures, the highest yields of swedes followed the use of 140 lbs. nitrate of soda or 150¼ lbs. nitrate of lime, each supplemented by 3 cwt. superphosphate, 4 cwt. steamed bones, and 2 cwt. kainit. Almost 22 tons of swedes per acre were obtained from plats treated with (1) 397 lbs. potassic superphosphate, 4 cwt. steamed bones, and 1 cwt. sulphate of ammonia, and (2) 3 cwt. superphosphate, 2 cwt. kainit, 4 cwt. steamed bones, and 1 cwt. sulphate of ammonia. The cost of fertilizer per ton of swedes was 11¼ d. in case of the former mixture and 11½ d. in case of the latter. In a test of phosphorus sources a slightly greater yield followed the use of 407 lbs. of bone meal than that of 468 lbs. of dissolved bones. A superphosphate plat excelled a basic slag plat in yield during 1909 and again in 1910.

In a test of seed potatoes of various sizes the seed size between 1¼ and 1½ in. produced considerably lower yields than larger sizes, either cut or whole, for which the yields were approximately equal.

In a test of 12 applications of fertilizers and fertilizer mixtures on grass at Blurton Center, the greatest increases (1 ton each) over the check plat during 1910, followed the use of 12 tons of farmyard manure alone and of 1 cwt. nitrate of soda and 3 cwt. kainit, and of 1 cwt. nitrate of soda, 5 cwt. basic slag, and 3 cwt. kainit. During the 12 years 1899–1910 the same applications resulted in the highest average yields. Similar grass experiments were conducted at 5 other points. Fertilizer experiments with potatoes in 2 localities and with swedes and sugar beets, 1 locality each, are also reported, and variety tests with wheat, oats, and mangels.

Report on the agricultural stations in the Central Provinces and Berar for the year 1909–10, R. G. ALLAN, D. CLOUSTON, and G. EVANS (*Dept. Agr. Cent. Prov. and Berar [India] Rpt. 1909–10, pp. 67*).—This report deals with the work done at Nagpur, Raipur, Akola, and Hoshangabad agricultural stations and at the Telinkheri cattle breeding and seed farms. Earlier work at these farms has already been noted (E. S. R., 22, p. 440).

At the Nagpur station a wheat fertilizer test indicated that better results followed the application of cattle dung alone than were obtained on 10 other plats treated with saltpeter, bone dust, the ashes of manure, and various green manures singly and in various combinations. Forty lbs. of nitrogen per acre applied to plats planted to a cotton, sorghum, tur rotation was followed by better results when the nitrogen was applied in the form of farmyard manure and night soil than in the form of bone dust and saltpeter. In a 7-year test, top-dressing with sufficient saltpeter to supply 20 lbs. of nitrogen per acre gave better results than drilling the same amount or the use of cattle manure. Applications of (1) 5 tons cattle dung per acre and (2) 2½ tons cattle dung and 2 maunds (164 lbs.) of nitrate of soda were followed by yields of 1,074 and 1,621 lbs. of jute fiber respectively. During the period 1906–1910 the urine produced by 2 bullocks during a 30 day period and conserved in dry earth was followed by approximately the same yields of wheat and sorghum, when applied as a fertilizer, as followed an application of both dung and urine of 2 bullocks for a 30-day period, while the application of the dry excreta alone was generally followed by a much lower yield. A mixture of nitrate of soda, superphosphate, and sulphate of potash proved as a rule of greater value in cotton growing than any one of these fertilizers or mixtures of any two of them. The use of 3 maunds (246 lbs.) per acre of superphosphate produced an unprofitable increase in the yield of hemp fiber.

At the Raipur station it proved profitable to transplant medium or late rice which had been sown after a dressing of farmyard manure. An application of calcium cyanamid supplying 20 lbs. of nitrogen per acre resulted in a greater increase in 1909–10 than followed the use of dry leaves, tank silt, or castor cake, but was excelled by cattle dung, bone dust, or saltpeter mixed with bone dust. Nitrogen applied in night soil after the Meagher system apparently produced a greater increase in the wheat yield than resulted in the application of 30 lbs. of nitrogen in 1 year old poudrette, or in farmyard manure, bone dust, bone dust top-dressed with saltpeter, castor cake, saltpeter, green manure, or tank silt. When teora, urid, and gram were sown in the standing rice immediately after the rice was harvested, teora gave the best results. Wheat and gram sown together at the rates of 75 and 25 lbs. per acre produced better results than were obtained from sowing in the ratios of 25:75 or 50:50. In a test of peanut varieties followed by wheat as a second crop, the local varie-

ties excelled Virginia, Japanese Big, Pondicherry, Madras, and Mozambique. Analyses of peanuts grown in 1909–10 are reported.

At the Akola station a cotton, wheat, cotton rotation gave better results in a 3-year test than did continuous cropping with cotton. Cotton plants spaced 6 to 7 in. apart in rows 15 in. apart produced better results than when the plants were further apart in the row. Topping the plant about 1 ft. above the ground delayed the time of flowering and fruiting and lessened the yield. In a 3-year variety test Rosea cotton gave better results than any other variety but Rosea-cutchica produced the highest results secured during any one year. Night soil excelled cattle dung and saltpeter as a fertilizer for cotton and sorghum grown in rotation.

At the Hoshangabad farm several local crops were tested as green manures on irrigated unmanured wheat plats. Other tests conducted at this farm dealt with the proper time for the application of commercial fertilizers, the relative value of calcium cyanamid and calcium nitrate in flax and wheat growing, and tests of various local crops and implements. The application of a mixture of ammonium sulphate supplying 20 lbs. of nitrogen and superphosphate supplying 25 lbs. of phosphoric acid produced higher hay yields during 1908–9 than were secured from the fertilizers sulphate of potash, farmyard manure, nitrate of soda, or basic slag, singly or in various combinations, or at various rates.

Annual report of the agricultural stations in Eastern Bengal and Assam for the year ending June 30, 1910 (*Ann. Rpt. Agr. Stas. East. Bengal and Assam, 1910, pp. 162, maps 3*).—This contains the annual report of the Dacca, Burirhat. Rajshahi, Jorhat, Fruit, Upper Shillong, and Wahjain experiment farms. The experiments dealt with fertilizers for winter rice, spacing of winter rice, nitrobacterine inoculation of peas, tests of tobacco, potatoes, jute, flax, wheat, corn, sugar cane, oats, mustard, and many native crops, spraying trials with potatoes, and work in grafting fruit trees.

[Cereal, forage crop, green manuring, and potato experiments], P. B. Kennedy, E. Bunker, Jr., and E. H. Syphus (*Rpt. Lincoln Co.* [*Nev.*] *Expt. Farm, 1909–10, pp. 25–34, pls. 3*).—Eight wheat varieties, 7 barley varieties, and 5 oat varieties were tested in the Moapa Valley. Sowing oats, barley, and durum wheat as late as March 3 was not found advisable. In other tests, 4 acres of oats yielded 52 bu. per acre and 3 acres of barley 40½ bu. per acre, although the grain was sown too thick and the heads were small. In tests without irrigation, an estimated yield of 60 bu. per acre of Turkey Red wheat was secured on 6 acres of saccatone land. The method used is stated in detail.

Numerous varieties of alfalfa were tested and the varieties selected as worthy of special attention were Algerian 12803, Arabian 8823, Arabian 12992, Argentina 3508, Peruvian 13564, Provence 19522, Spain 17992, Tripoli 12847, and Turkestan 1159. German and Pearl millet grew very well and matured by the middle of August, but no favorable results are reported with corn. Among 21 varieties of pumpkins tested Mammoth King, Cushaw, Black Negro, Burpee Golden Oblong, and Golden Russett were selected as worthy of mention. Brief notes are also given on 9 sorghum varieties tested.

In a test of numerous legumes for green manuring, the heaviest yields of green crop, 3,410 and 2,470 lbs. per acre, were secured from hairy vetch (*Vicia villosa*) and lentils (*Ervum lens*).

Among 5 varieties of potatoes grown in 1909 Burbank proved the best with a calculated yield of 5,402 lbs. per acre, while in 1910 among 7 varieties Early Ohio proved the best with a calculated yield of 2,705 lbs. per acre.

Grains recommended for trial, G. W. Shaw (*California Sta. Circ. 71, pp. 16, figs. 17*).—This circular briefly describes a number of wheat, barley, and oat varieties recommended for trial by growers and reports comparative tests.

The average yield of Bobs since 1907 has been 35.3 bu. per acre. A milling test of Fretes showed it to be free-milling in character, and to have 40 per cent wet gluten content as compared with 38 per cent for White Australian grown under the same conditions and milled at the same time. In 3 different counties it yielded from 5 to 10 bu. more than White Australian. In the same counties Early Baart usually produced about 10 per cent more than White Australian. King Early usually exceeded White Australian in yield and equaled it in quality. Galgalos has yielded well when under favorable conditions.

The gluten content of Chul is about 1 per cent higher than that of the wheats commonly grown in California, but this variety is sometimes objected to on account of its hardness and the fact that the volume of loaf obtained is slightly smaller than in case of other wheats. "In its ability to withstand drought it is a strong rival of the durum wheats. For instance, on one of the experiment stations of the University of California in 1908 it yielded at the rate of 63.3 bu. per acre and received less than 8 in. of rainfall and was not irrigated. On another station the yield was at the rate of 63½ bu. per acre, with only 10 in. of rain, and on still another station, at the rate of 51 bu. per acre."

Marouani proved especially adapted to the making of semolina. Kubanka yielded 26.6 bu. in Stanislaus County, 37.4 bu. in Tulare County, and 40.5 bu. in Yolo County. Velvet Don yielded 23.5 bu. in Stanislaus County and 44.2 bu. in Yolo County.

At the San Joaquin Valley Substation the average yield of Beldi barley during the past 5 years has been 64.4 bu. per acre as compared with 49.6 bu. of common barley under similar conditions. It averaged 51.5 bu. in the Sacramento Valley during 1908–1911. Since 1905 Hannchen barley has averaged 54 bu. per acre in both valleys. White Smyrna has averaged 59.5 bu. per acre since 1902 in the San Joaquin Valley and 46.2 bu. during 4 years at the University Farm at Davis. Tennessee winter barley has averaged 57.7 bu. per acre at Davis since 1907.

The Burt oat has averaged about 20 per cent higher in yield, and Sixty Day about 33 per cent more, than the common oat. The Red Algerian oat has averaged about 7 per cent more than the common red oat.

Observations on the status of corn growing in California, M. E. Sherwin (*California Sta. Circ. 70, pp. 3–20, figs. 8*).—It is pointed out that although California ranks eleventh among the States as to yield of corn per acre and third as to farm price per bushel and farm value per acre, in total acreage the State ranks thirty-sixth, and the author here discusses this small production and the outlook for the future on the basis of inquiries among 125 present or former corn growers and other data.

The reasons given against corn growing are the scarcity of labor, the relatively small profits per unit of expenditure, and the lack of water. There is also much trouble in some sections from corn smut and corn worms, the blistering of the tassels by the sun before pollination, and the excessive suckering. The reasons for growing corn are also presented and data given as to the causes of suckering, thickness of planting, varieties, irrigation, time to maturity, quality of corn, disposition of the stalks, and the use of the husks as tamale wrappers.

Lespedeza or Japan clover, W. R. Dodson et al. (*Louisiana Stas. Bul. 130, pp. 64, figs. 15*).—This is a collection of papers presented at the annual meeting of the Louisiana Lespedeza Growers' Association, June 27–28, 1911, dealing with methods of growing and utilizing lespedeza, the marketing and grading of lespedeza hay, and other data.

Lespedeza, by W. R. Dodson (pp. 5–20).—Analyses made at the Louisiana Stations show that lespedeza roots and stubble contain on a 10 per cent water

content basis 0.333 per cent of phosphoric acid, 1.656 per cent nitrogen, and 0.261 per cent potash, while the stems and leaves contained 0.468, 2.286, and 0.432 per cent respectively of the same constituents. It was found that 54.6 per cent of second year lespedeza in a very thick stand was leaves and buds and 45.4 per cent stems. The green leaves contained 70.27 per cent of water as compared with 70.59 per cent in the green stems. Other determinations were made which showed a variation of 3 to 5 per cent. Chemical analyses of the stems and leaves of this sample reduced to a 10 per cent water basis showed that the leaves contained 20.35 per cent protein, 7.19 per cent fat, 39.15 per cent carbohydrate, 17.32 per cent fiber, and 5.99 per cent ash. The stems contained 8.334 per cent protein, 1.91 per cent fat, 33.845 per cent carbohydrates, 42.16 per cent fiber, and 3.73 per cent ash.

A discussion of the influence of rain and dew on the composition of lespedeza accompanies analyses of hay collected and cured under various weather conditions. Some samples were exposed to heavy rains as well as sunshine and one was cured under shelter. There was very little difference in the analyses, no more in fact than might be expected if all the samples had been collected at the same time from any average field. Analyses of (1) late harvested lespedeza, (2) mixed lespedeza and Bermuda, and (3) dried lespedeza leaves such as are scattered at the baling press, are also presented.

The remaining papers are as follows: Lespedeza Observations, by L. E. Morgan (pp. 21–24); Curing Hay, by E. L. Gladney (pp. 25–27); Suggestions for Curing Lespedeza or Japan Clover Hay, by K. T. Catlett (pp. 27–30); Transforming a Cotton Farm into Lespedeza Fields, by A. L. Smith (pp. 30–36); Marketing Hay from the Merchant's Viewpoint, by J. S. McGehee (pp. 36–38); Obnoxious Weeds in Lespedeza and their Eradication, by A. D. McNair (pp. 38–43); The Economy of Lespedeza as a Roughage compared with Grass Hays, by W. H. Dalrymple (pp. 43–51); Sheep and Lespedeza, by J. Clayton (pp. 53–55), Difficulties in Securing a Good First-Year Stand of Lespedeza, by G. O. Denham (pp. 55–59); and Marketing Hay from the Farmer's Viewpoint, by I. C. Terry (pp. 59–64).

The soy bean and its products, E. Bontoux (*Matières Grasses, 4 (1911), No. 36, pp. 2195–2199*).—This is a discussion in regard to the soy bean, and considers the plant, its origin, species and varieties, culture and production, the uses to which the plant and grain may be put, and the analyses of soy beans from various sources.

Sugar cane seedlings, H. P. Agee (*Louisiana Stas. Bul. 127, pp. 5–23, figs. 5*).—This paper, presented before the Louisiana Sugar Planters' Association, April 13, 1911, contains a report of the results of attempts to originate a superior variety of sugar cane by importing cane arrows for propagating seedlings. The earlier attempts to secure germination from imported seed proved unsuccessful and seed-bearing varieties grown under glass at the sugar experiment station at Audubon Park, La., grew well but formed no flowers.

Seedlings were then imported, and of these D 74 and D 95 possess marked superiority over the purple and striped canes, but it is still hoped that new seedlings will be found superior to either of these.

In 1906 cane plants were first produced "from seed without the bounds of the tropics." The author describes fully the method by which successful germination was accomplished.

During the first year the cane of these seedlings is, as a rule, dwarfed and the sugar content low, so that the plants give little indication as to what they will ultimately do. The second year full-sized canes are produced with wide variation in color, size, sucrose content, and manner of growth. Wide variation is observed in cane from the same lot of seed.

In 1907, 113 plants survived and in the second year the majority of them proved vigorous growers. Two of them, designated L 100 and L 92, gave special promise, the latter showing a sugar content slightly higher than that of D 74. Unfortunately, however, these canes have more recently given less promise, indicating, the author believes, that a test of considerable length is necessary before the value of a new seedling can be determined.

During 1908, 387 plants were produced. A table states the source of seed and the varieties from which each of these plants was obtained and the author calls attention to the large number of germinations from seed secured from Antigua. Although a large assortment of seed was secured for use during 1910, none of the plants survived.

In order to show that there is a possibility of originating types of cane of better sugar content than those now cultivated in Louisiana, the author calls attention to the fact that 8 of the 1909 seedlings gave juices with a higher sucrose content than that of D 74. Seven of these were from the parent cane B 147. An even greater number of the 1908 seedlings show a satisfactory sucrose content, and among these 14, L 511 is especially noteworthy with a sucrose content of 16.3 per cent.

Tobacco growing in Ireland (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 2, pp. 228–237*).—Discussions of the method and scope of the experiment are followed by detailed statements of the expenses per acre of producing pipe, cigarette, cigar, and mixed tobaccos. The expense of performing each operation on each of 10 farms is stated in tabular form.

The extermination of morning glory, F. T. Bioletti (*California Sta. Circ. 69, pp. 12, figs. 7*).—Directions for the control of the wild morning glory (*Convolvulus arvensis*) accompany the statement of the results of tests of various methods on 10 acres of bare land at Davis.

Roots well supplied with starch and capable of producing new shoots have been found at the depth of 14 ft. In a deep rich soil little difference was observed in the number of grams of roots per cubic foot of soil at different levels down to the sixth foot. Micro-chemical examination showed about an equal starch supply at all levels.

Tests on uncultivated soil and soil on which ordinary good cultivation had been practiced showed 15.8 and 15.1 gm. of roots per cubic foot of soil respectively. The author, therefore, regards the effect of ordinary good cultivation on the roots in the upper 3 ft. of soil as "apparently nil." The roots were, in all cases, well supplied with starch.

Cutting the weeds every 5 days resulted in a diminution for the season of about 70 per cent in average weight of roots per cubic foot of soil. "If this decrease in the quantity of roots were the whole effect of the work it would not be worth the expense. Micro-chemical examination of the roots, however, showed that many of them were almost devoid of starch and that, in all, the amount of starch was very small compared with that of roots from the other sources." The absence of starch indicates an exhaustion of the reserve food material as shown by the fact that less than half a dozen morning glory shoots occurred on the 10 acres the following year.

The cost of 30 weed cuttings which accomplished this result is estimated at $9 per acre. Thirty days' work was required on the 10 acres. The knives were run no more than 3 in. below the soil surface, but the author believes that if run 5 to 6 in. deep the number of cuttings might be diminished without inferior results as the time between cuttings might be lengthened.

HORTICULTURE.

New plant immigrants, D. FAIRCHILD (*Nat. Geogr. Mag., 22 (1911), No. 10, pp. 879–907, figs. 34*).—A popular, illustrated account of some of the more important fruits, vegetables, and other plants introduced into this country by the Office of Foreign Seed and Plant Introduction of the U. S. Department of Agriculture.

[Phenological notes: Blooming dates for Iowa plants, 1910], CHARLOTTE M. KING ET AL. (*Trans. Iowa Hort. Soc., 45 (1910), pp. 209–224, pls. 3*).—The records for 1910 are given by a number of observers from different parts of the State showing the dates of the first blooming of trees, shrubs, and flowering plants.

Are the springs colder now? G. REEDER (*Ann. Rpt. Mo. Bd. Hort., 4 (1910), pp. 119–133, figs. 2*).—A discussion on late spring frosts in relation to the fruit crop of Missouri, based chiefly on climatological data secured by the self-recording instruments at Columbia, Mo., during a period of 20 years. The data, as a whole, show that the month of April during the last 10 years averaged 3.6° colder and that May was 1.7° colder than for the preceding 10 years. The opinion is advanced, however, that the period of late spring frosts is again receding.

Horticulture (*Rpt. Lincoln Co. [Nev.] Expt. Farm, 1909–10, pp. 34–49, pls. 6*).—This comprises notes on the behavior of various orchard and small fruits, nuts, trees, shrubs and vines, lawn grasses, vegetables, and miscellaneous plants and herbs being tested at the Lincoln County Experiment Farm, Nevada.

Facts and figures, or the A B C of Florida trucking, C. H. KENNERLY (*St. Augustine, Fla., 1911, pp. 137, figs. 48*).—A popular treatise on the culture of various truck crops in Florida, including general chapters on soil, preparation of the soil, seed and planting operations, irrigation, implements, fertilizing, seed beds, marketing, and insecticides.

The home vegetable garden, J. W. LLOYD (*Illinois Sta. Circ. 154, pp. 32, figs. 7*).—Popular directions are given for growing a home supply of vegetables on the farm, in the village, and in a city back yard. In addition to cultural details, consideration is given to the temperature and moisture requirements of different vegetables and they are classified according to cultural demands. The production and storage of the winter supply and the selection and purchase of garden seed are also discussed.

Notes on edible fungi, G. E. MATTEI (*Gior. Sci. Nat. ed Econ. [Palermo], 28 (1911), pp. 89–101*).—This comprises descriptive and cultural notes on a number of edible fungi, including references to the literature.

Packing Valencia fruit and vegetables, R. FRAZER, Jr. (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 275, pp. 961–966*).—The methods of preparing fruit and vegetables for shipment are described.

The cultivation of deciduous fruits in Naples, L. SAVASTANO (*Reprint from Atti R. Ist. Incoragg. Napoli, 6. ser., 9 [1910], pp. 98*).—A critical and synthetical examination of the fruit industries of Naples, previously noted (E. S. R., 24, p. 441).

Propagation and cultivation of fruit trees in Japan, T. IKEDA (*Jour. Roy. Hort. Soc. [London], 37 (1911), No. 1, pp. 95–102, pl. 1*).—The methods of propagating various fruits, together with the important orchard operations in Japan, are described.

In connection with the use of fertilizers, the author calls attention to the custom of burying empty salt packages near the roots of persimmon trees as a remedy against premature dropping of the fruit. Although no accurate experi-

ments have been conducted, the author is convinced that the dropping is caused by the rapid growth of the shoots and roots, as well as by the want of some nutriment. The use of the salt packages, it is suggested, serves to furnish a supply of magnesia, which has been found to be low in persimmon trees in the off year. The mixture of sodium and magnesium salts thus applied also tends to retard the absorption of water by the roots, thus preventing rapid growth of the roots and shoots with the consequent dropping of fruit.

Fall versus spring planting of fruit trees, J. C. WHITTEN (*Nat. Nurseryman, 19 (1911), No. 11, pp. 412–414*).—Data showing the actual growth made by apple trees planted at the Missouri Station in the fall as compared with those planted in the spring were recorded for the seasons 1909 and 1910.

The results, which are here summarized and discussed, show a considerable increase in the growth development of the autumn-planted over the spring-planted trees. It was also noted that new root growth began to form very quickly on the trees planted in autumn, whereas roots did not begin to form abundantly on the spring-transplanted trees until about 2 months after the trees had been transplanted. Wounds caused by root and by branch pruning started to callous quickly in the fall, indicating that the plant food materials were in a condition to be transported and utilized for this purpose even though there was no visible pushing of the buds or growing tips. Root growth on autumn-transplanted trees appears to continue until the frost reaches the growing root in question.

Observations on other trees than those included in the present experiment led the author to believe that apples, pears, hardy plums, and cherries generally do better in Missouri if transplanted in autumn than they do when transplanted in the spring. Peach trees and some tender or half-hardy ornamentals should be transplanted in spring.

Do orchards need fertilizer? J. P. STEWART (*Amer. Agr., 88 (1911), No. 22, pp. 522, 527*).—In answer to this question the author cites evidence from experiments conducted by the Pennsylvania Station during the past 5 years to show that many orchards growing on different types of soil are as much in need of fertilizers as other agricultural crops, although in certain cases no important results from the use of fertilizers have been observed as yet. In short, the fertilizer requirements of a specific orchard can only be accurately determined by experimenting in that orchard.

Pruning fruit trees, U. P. HEDRICK (*New York State Sta. Circ. 13, pp. 8*).—A popular discussion of the principles and operation of pruning with reference to transplanted and newly planted trees and to the subsequent treatment of the orchard for the development of wood and fruit.

The cost of growing apples, M. C. BURRITT (*N. Y. Tribune Farmer, 11 (1911), No. 523, pp. 1, 2, 18, figs. 4*).—A discussion of the factors which enter into the the cost of producing apples, with tabular records prepared by E. H. Thomson of the U. S. Department of Agriculture showing the cost of developing 3 small orchards in New York State.

By growing crops between the tree rows and by filling the orchard with earlier bearing fruits, the cost of growing a 6.6-acre apple orchard for an 8-year period was reduced from $124.27 an acre to $44.55 an acre. The cost of a 5-acre apple and peach orchard was likewise reduced from $72.10 an acre to $9.47 an acre for the first 4-year period. The cost of a 14-acre apple orchard for the first year was entirely met from intercrops of corn, potatoes, and beans.

An index to illustrations of apples, E. A. BUNYARD (*Jour. Roy. Hort. Soc. [London], 37 (1911), No. 1, pp. 152–174*).—This index, which has been compiled to assist those engaged in pomological research, comprises an alphabetical

list of apples with references to figures appearing in publications of various countries.

The peach in New York (*New York State Sta. Circ. 15, pp. 8*).—A popular circular discussing location and soil, fertilizers for peaches, moisture requirements, cultivation, hardiness, the principal diseases, pruning, cover crops, and thinning the fruit.

From the station's collection of over 300 varieties of peaches, a list is here given of 23 varieties, grouped in periods of ripening, which are considered most worthy of planting in commercial orchards.

Self-sterility in plums, W. BACKHOUSE (*Gard. Chron., 3. ser., 50 (1911), No. 1296, p. 299*).—The results thus far secured from pollination experiments, started in 1910, with ordinary European plums show that the varieties fall into 2 sharply defined groups, self-fertile and self-sterile, just as do the Japanese and American plums. The author suggests that the "June drop" of American plums as well as the early "stoning" of Greengages and cherries may result from self-pollination.

Small fruits: Management and varieties (*New York State Sta. Circ. 14, pp. 8*).—This contains popular suggestions relative to the management of a small fruit plantation, attention being given to the location and exposure of the plantation, tillage, fertilizers, planting distances, pruning, protection of plants, and selection of varieties.

Lists of strawberries, raspberries, currants, and gooseberries, including many standard kinds and some of the newer varieties considered worthy of more extended trial, are given.

On some effects of drought with special reference to pruning grapevines, L. RAVAZ and G. VERGE (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 47, pp. 602–608*).—Growth, yield, and vintage data, together with data on moisture evaporation from the bunches, leaves, and shoots of grapes lead the authors to conclude that the sensitiveness of the vine to drought is dependent on the number of bunches of grapes on each vine. On dry situations reduction in number and length of the canes is recommended, as well as wider planting distances, suitable plowing, and removal of soil from the base of the vines to permit the penetration of rain water to the subsoil.

As compared with the leaves the evaporating power of the bunches is very slight. Intact bunches do not directly absorb either rain or irrigation water.

Bleaching walnuts with an electrolyzed solution of salt, L. J. STABLER (*Cal. Fruit Grower, 44 (1911), No. 1221, p. 5, figs. 2*).—The process described consists in subjecting walnuts to the action upon the shells of an electrolyzed solution of salt. The salt solution is applied to the shells by spraying or dipping the walnuts in the liquid and allowing it to dry upon them. The electrolyzing apparatus is illustrated.

Lily-of-the-valley culture and fertilizer experiments in Tannenhof, F. STOFFERT (*Möller's Deut. Gärt. Ztg., 26 (1911), Nos. 39, pp. 458–463; 40, pp. 474–476, figs. 12*).—The author describes improved methods of growing lily-of-the-valley pips and gives the results of fertilizer experiments conducted since 1907. He finds that contrary to a common opinion commercial fertilizers exert no injurious influence on the forcing quality of the pips nor upon their adaptability for cold storage. A complete fertilizer containing a sufficiency of all the elements produces pips which force out quickly and vigorously.

The herb garden, FRANCES A. BARDSWELL (*London, 1911, pp. VIII+173, pls. 16*).—This is a popular English work containing cultural directions, together with information relative to the uses of different herbs, gathering, drying, and storing.

[Resoiling the Boston Common] (*Boston Evening Transcript, 1911, Nov. 29, p. 2*).—An account is given of the work of rejuvenating the soil on the Boston Common with the view of saving the existing trees and producing better conditions for the growth of grass. Thus far 13 acres have been resoiled at a cost of about $7,500 per acre.

FORESTRY.

The Bradley bibliography, I.—Dendrology, Part I, A. REHDER (*Cambridge, Mass., 1911, pp. XII+566*).—The Bradley Bibliography, which is being compiled at the Arnold Arboretum under the direction of C. S. Sargent, is to comprise, as a whole, a guide to the literature of the woody plants of the world published before the beginning of the twentieth century.

The present volume includes all botanical publications containing references to woody plants, except those which are restricted to a particular family, genus, or species. The latter will appear in volume 2. The literature is presented under the following general subjects: Auxiliary and miscellaneous publications, introductory publications, morphology and anatomy, physiology, pathology, ecology, evolution, phytography, and ethnobotany. The titles are arranged systematically according to subjects and under each separate subject they are arranged chronologically, except in the case of periodicals where an alphabetical arrangement is used.

The third volume is to contain the titles of publications dealing with the economic products and uses of woody plants, and with arboriculture, including the ornamental values and uses of trees and shrubs. The fourth volume will be devoted to forestry, and the fifth volume will comprise an index to all titles enumerated in these 4 volumes, arranged alphabetically according to authors and titles.

A leaf key to the genera of the common wild and cultivated deciduous trees of New Jersey, MARY F. BARRETT (*Upper Montclair, N. J., 1911, pp. 7*).—This key is based primarily upon leaf characteristics. For further identification in some instances references are also made to winter buds, bark, and to various stem markings.

Western yellow pine in Arizona and New Mexico, T. S. WOOLSEY, JR. (*U. S. Dept. Agr., Forest Serv. Bul. 101, pp. 64, pls. 4, figs. 12*).—This comprises a study of western yellow pine (*Pinus ponderosa*) relative to its forms in the Southwest, soil and climatic requirements, development, longevity, tolerance, causes of injury, and reproduction, including growth, stand, and yield data. The wood is discussed relative to its gross and microscopic structure, quality, weight, strength, uses, and preservative treatment. Consideration is also given to lumbering in the Southwest, grades of yellow-pine lumber obtained, markets for yellow pine, and sale of timber on the National Forests. The methods of management applied to yellow pine on the National Forests are described with the hope that they may be applied, wherever possible, by private owners.

The appendix contains volume tables based on analyses taken on the Tusayan Forest in 1905 and 1906.

The forests of Oregon: Their importance to the State, G. W. PEAVY (*Oreg. Bd. Forestry Bul. 1, 1911, pp. 23, figs. 9*).—A popular conservation bulletin, setting forth the more important economic facts relative to Oregon woodlands as well as the forest policy of the Government and State.

The Crater National Forest: Its resources and their conservation, F. BURNS (*U. S. Dept. Agr., Forest Serv. Bul. 100, pp. 20, pls. 4*).—A descriptive account is given of the Crater National Forest in southwestern Oregon relative to its

topography and drainage, water for fruit and farm lands, water power, timber, burns, grazing, mining, settlement, and permanent improvements. The timber is considered relative to species and amount, forest types, insects and diseases, market, and management. The methods which have been undertaken for the conservation and proper utilization of these resources are also considered.

Avalanches and forest cover in the Northern Cascades, T. T. MUNGER (*U. S. Dept. Agr., Forest Serv. Circ. 173, pp. 12, pls. 31*).—This comprises the results of a field study conducted to determine to what extent, if any, the forest cover prevents the formation of avalanches or lessens their severity.

The subject matter is presented under the following general headings: Kinds of avalanches, avalanches in the Northern Cascades, character of avalanches in the region studied, the relation of forest cover to the formation of slope slides, the effect of forests in checking avalanches, protection forests in the Alps, and preventive measures in the Northern Cascades.

The 2 general classes of avalanches occurring in the Northern Cascades are canyon slides and slope slides. Canyon slides, which form a great majority of the avalanches, usually originate above timber line, or on precipitous, rocky slopes where the development of a well-stocked forest is practically impossible. On the other hand, it is concluded that slope slides, which frequently occur on deforested areas, are unnecessary and preventable and their frequency can be greatly lessened by observing the following 4 principles: Proper care of the area now forested, especially absolute fire protection; exclusion of grazing; careful cutting of timber on steep slopes; and reforestation of the denuded areas.

An example of afforestation in the French Vosges, G. HATT (*Ann. Sci. Agron., 3. ser., 6 (1911), II, No. 4, pp. 243–247*).—The more important data are given of a successful attempt at afforestation in the Vosges.

Reforestation on the National Forests.—I, Collection of seed. II, Direct seeding, W. T. COX (*U. S. Dept. Agr., Forest Serv. Bul. 98, pp. 57, pls. 7, figs. 5*).—This bulletin contains an account of the work of the Forest Service in reforesting unproductive lands of the National Forests by means of direct seeding. The introductory remarks comprise a general review of the present conditions on the National Forests and of the policy of the Forest Service with regard to the reforestation of denuded areas.

Part 1 discusses in detail the gathering, extracting, testing, and storage of the seed; part 2 deals with methods of direct seeding and gives a number of instances of successful direct seeding in various National Forests. The appendix contains notes on individual species with special reference to their use in reforestation.

The National Forest manual (*U. S. Dept. Agr., Forest Serv., 1911, pp. 45*).—This comprises instructions to forest officers, issued by the Secretary of Agriculture to take effect November 1, 1911, and relating to forest plans, forest extension, forest investigations, libraries, cooperation, and dendrology.

Instructions to forest fire wardens and woodland owners regarding forest fires, A. F. HAWES (*Vt. Forest Serv. Pub. 7, 1911, pp. 19, pls. 6*).—The chief purpose of this publication is to bring the new Vermont law relating to protection against forest fires to the attention of fire wardens and woodland owners.

Preservation of timber from decay, W. F. GOLTRA (*Railway and Engin. Rev., 51 (1911), Nos. 40, pp. 874–877; 41, pp. 900–903, fig. 1; rev. in Engin. Mag., 42 (1911), No. 3, pp. 433–436*).—The author presents a brief outline of Bethell's, Burnett's, and Rutgers's processes for preserving timber, as used chiefly in this country. The processes are discussed and tabular data are given showing results obtained in treating railway ties by each method.

A visual method for determining the penetration of inorganic salts in treated wood, E. BATEMAN (*U. S. Dept. Agr., Forest Serv. Circ. 190, pp. 5, fig. 1*).—To determine the penetration of zinc chlorid the freshly cut surface of a representative disk of the treated wood is dipped in a 1 per cent potassium ferrocyanid solution sufficiently long (not more than 10 seconds) to moisten the entire surface. The excess of the solution is removed from the face by blotting paper, the disk is dipped into a 1 per cent solution of uranium acetate, and allowed to dry. On drying the untreated portions will have a dark red or maroon color, while the treated portions will be slightly whiter than the natural wood, owing to the decolorizing action of soluble zinc salts on uranium ferrocyanid. The test can not be used on red oak because the natural color of the wood masks that of the uranium compound.

This test is capable of detecting the presence of zinc chlorid in treated wood in amounts as small as 0.17 lb. of the salt per cubic foot of wood.

In testing for salts of copper, it is only necessary to dip the disk in the solution of potassium ferrocyanid, the presence of copper being shown by a dark red coloration in the treated zone. With salts of iron the same reagent gives a deep blue coloration. The penetration of mercuric chlorid can be determined by treating a specimen disk with a solution of hydrogen sulphid, a black precipitate of mercuric sulphid being formed.

Forest products of Canada, 1910.—Cross-ties purchased, H. R. MACMILLAN and W. G. H. BOYCE (*Dept. Int. Canada, Forestry Branch Bul. 21, 1911, pp. 8*).—The number and cost of poles used during the year are classified by species and by length classes. The prices of poles in Canada and the United States are compared and the possibility of treating the poles with creosote and other preservatives is briefly discussed.

The total number of wooden poles purchased in Canada during 1910 was 782,841, or an increase of about 118 per cent over the previous year.

Forest products of Canada, 1910.—Cross-ties purchased, H. R. MACMILLAN and W. G. H. BOYCE (*Dept. Int. Canada, Forestry Branch Bul. 22, 1911, pp. 7*).—There were 9,213,962 cross-ties purchased in 1910 by the steam and electric roads of Canada. The production by species and method of manufacture are indicated and the preservation of railway ties is briefly discussed.

Forest products of Canada, 1910.—Timber used in mining operations, H. R. MACMILLAN, B. ROBERTSON, and G. BOYCE (*Dept. Int. Canada, Forestry Branch Bul. 23, 1911, pp. 12*).—A statistical summary showing the amount of round and sawed timber used in the mines of the Dominion and of the several Provinces during the year, giving also the quantity of wood of the different species. About 52,848,000 linear feet of round timber and 22,305,000 ft. b. m. of sawed timber were used for mining purposes in 1910.

DISEASES OF PLANTS.

The rational and efficient treatment of plant diseases in agriculture and horticulture, E. BOURCART (*Les Maladies des Plantes, leur Traitement Raisonné et Efficace en Agriculture et en Horticulture. Paris, 1910, pp. VI+655, figs. 14*).—Accounts are given of the various substances that are used as fungicides and insecticides, and their properties, methods of preparation and use, and effect on host plants and parasites are described. The various fungus diseases and insect pests are enumerated in alphabetical order, and such descriptions are given as will aid in their easy recognition.

The galls of plants, E. KÜSTER (*Die Gallen der Pflanzen. Leipsic, 1911, pp. X+437, figs. 158*).—This is a text-book for botanists and entomologists, in which the author gives a general survey of the subject of plant galls and

describes the various plants and animals that form galls and the effect produced by them on the host plant. Chapters are given on the anatomy, chemistry, etiology, and biology of galls, followed by a brief account of gall-like formations in animals.

Peculiar spore forms of Botrytis, S. R. PRICE (*New Phytol., 10 (1911), No. 7–8, pp. 255–259, figs. 8*).—A description is given of some unusual spore forms of Botrytis occurring in connection with sclerotia found on the stem of hemlock (*Conium maculatum*). The spores are considered resting spores and, as they occur in nature, may be regarded as constituting a normal phase in the life history of the fungus.

The Uredinales, A. TROTTER (*Flora Ital. Crypt., 1 (1908), No. 4, pp. 144, figs. 58; 1 (1910), No. 7, pp. 145–338, figs. 19*).—This is a monographic study of the genera Uromyces, Puccinia, and Gymnosporangium.

The spread of mildew from wild to cultivated plants, E. NOFFRAY (*Jour. Agr. Prat., n. ser., 21 (1911), No. 18, pp. 562–564; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1152, 1153*).—An account is given of the mildew *Erisyphe communis*, which at times proves injurious to plants of economic importance in gardens and fields, the spread of the fungus being to a considerable extent from wild plants. The author enumerates a large number of species of plants that are hosts for this mildew and recommends their destruction wherever possible. Where the mildew appears on clover, as it frequently does, it is recommended that the clover be mowed for a distance of a yard or more about the diseased area and the plants removed to prevent further spread.

The experimental production of chlorosis in maize, P. MAZÉ (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 19, pp. 902–905*).—A series of experiments is reported in which corn was grown in water cultures containing a complete nutrient solution, and comparisons made with similar cultures in which single elements, as manganese, iron, sulphur, chlorin, lime, etc., were omitted.

In the check culture the plants grew to maturity. Those deprived of sulphur and iron were less developed, and within 15 days after being placed in the solution their leaves had taken on an abnormal color and well-developed chlorosis appeared. This was evident soonest in the plants which had been deprived of sulphur, appearing somewhat later where iron was wanting. The parenchyma of the chlorotic leaves was very thin and transparent, showing that chlorosis was a result of abnormal nutrition. A microscopic examination of the tissues showed that the cells rarely contained starch in connection with the chloroleucites. The introduction into the nutrient solution of the compound which was wanting caused the restoration of the green color and the plants developed vigorously.

In one series of experiments, drops of a dilute solution of sulphate of ammonia were placed on chlorotic leaves. Within 3 days the green color had returned and it spread slightly to the adjacent cells. The portions of the leaf not covered by the sulphate retained their yellow color to the death of the leaf.

In conclusion the author states that chlorosis may be induced by a number of causes, and that it is possible that an excess of lime contributes to its production. In addition, an absence of sulphur or iron favors chlorosis. Depriving plants of chlorin, magnesium, and silicon did not cause chlorosis.

Some troublesome diseases of the potato tuber, A. S. HORNE (*Rpt. Brit. Assoc. Adv. Sci., 1910, p. 578*).—Attention is called to some of the diseases of the potato which are characterized by the appearance of blotches and streaks in the tuber. No organisms have been definitely associated with this, although the seed tubers are believed to be liable to propagate it. The internal disease is said to be often associated with the attack of *Phytophthora infestans* from

the soil. Spraying, although generally beneficial to the plant, is not a satisfactory remedy for the control of this trouble. Another form of the disease, which makes its appearance during storage and is locally known as bruise, is thought to be due to physiological influences.

The wart disease of potatoes (*Jour. Bd. Agr. [London], 18 (1911), No. 8, pp. 669, 670, pl. 1*).—The spread of the wart disease or black scab in England is reported, and it is stated that in several places the disease has disappeared during the year. These areas are supposed to be either ones in which the soil has not become infected or where resistant varieties of potatoes have been planted and the fungus has disappeared. It is stated that the hot weather of the past season had no effect in checking the development of the fungus. Some unusual forms of the disease are described, among them the appearance of the warty outgrowths on the stems and leaves.

A cucumber and melon disease new to Great Britain (*Jour. Bd. Agr. [London], 18 (1911), No. 8, pp. 670, 671, pl. 1; abs. in Gard. Chron., 3. ser., 50 (1911), No. 1301, p. 398*).—A description is given of the effect of the fungus (*Colletotrichum oligochætum*) on melons, cucumbers, and other cucurbitaceous plants. The disease is said to be prevalent in France and Italy, but hitherto unreported from England.

Every part of the plant is liable to attack, and when the soil becomes infected the young plants are quickly destroyed. On the stem the fungus causes the appearance of elongated spots of a pale yellowish-green color; on the leaves, circular spots, a half inch or more across, at first yellowish-green, later becoming brown. The diseased tissue becomes dry but never falls away, as in the case of some other fungus attacks. Upon the fruit the spots occur as deep sunken patches, formed near the tip. The young fruits often die within 2 or 3 days after infection and before the sunken places have time to appear.

Attempts have been made to control this disease, but neither sulphur nor Bordeaux mixture checks it. Spraying with a solution of potassium sulphid arrests its progress, as does also the application of self-boiled lime-sulphur mixture.

Some observations on the silver-leaf disease of fruit trees, F. T. Brooks (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 776, 777*).—An abstract is given of a paper on investigations on the silver-leaf disease of fruit trees, which principally attacks plum trees, although it is known to occur on apple and cherry trees and on red currant and gooseberry bushes. The author has reported certain experiments on the propagation of this disease, the principal results of which have been noted elsewhere (E. S. R., 24, p. 451).

Frost rings on the pear, R. E. Smith (*Mo. Weather Rev., 39 (1911), No. 8, p. 1257, fig. 1*).—A brief description is given of injury to pears caused by frost. The blemish consists of a scabby ring of surface tissue, which sometimes extends around the pear, or may occur only on one side or part way around the fruit. The effect somewhat resembles that of pear scab, but is easily distinguished as the fungus is never present.

Observations during the present season indicated that the ring formed around the pear is a frost effect occurring when the fruit is quite young. The surface tissue of the young fruit is slightly frozen just back of the petals of the flower, and such pears are not sufficiently injured to cause them to fall. They continue to develop, but on account of the injury to the tissue the fruit is constricted at this point.

Vine diseases in France, F. de Castella (*Jour. Dept. Agr. Victoria, 9 (1911), Nos. 6, pp. 394–398, figs. 2; 7, pp. 462–468, figs. 4; 9, pp. 651, 652, fig. 1; 10, pp. 673–676*).—Descriptions are given of the principal diseases of grapes in

France, with suggestions regarding their control, and their presence and the amount of injury in Australia are indicated.

A study of plant growth on ferruginous soils with special reference to the grape and grape chlorosis, G. Corso (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 4 (1910), pp. 129–142*).—A chemical study of soils on which normal and chlorotic grapes were growing indicated that the chlorosis was due primarily to a deficiency of iron but was aggravated by an excessive supply of lime in the soil, especially when the ratio of lime to magnesia was very great.

Observations on root diseases in the West Indies, F. W. South (*Agr. News [Barbados], 10 (1911), Nos. 249, pp. 366, 367; 250, pp. 382, 383*).—The author describes 3 forms of root disease, 2 of which are found on lime trees, while a third occurs on limes, cacao, and other plants of economic importance.

The black root disease, which is the one reported as occurring on other plants in addition to limes, is quite destructive. The first symptoms of infection may be noted in a thinning of the foliage. When such plants are examined the collar and the roots show the presence of a dark olive-green mycelium possessing a gray border along its advancing edge. Beneath this the bark is usually destroyed. The mycelium of this fungus, which is a species of Rosellinia, spreads rather rapidly and in addition to the fungus being propagated by means of spores, it spreads through the extension of the mycelium underground. For its control the author recommends the digging out and burning of infected trees and the treating of the soil with sulphate of iron.

The second disease is described as the red root of lime trees, which is due to a species of Sphærostilbe. Trees attacked by this disease lose some of their leaves, and the tips of the branches turn yellow and eventually wilt and die. On examination the bark is found brown in color, soft, and rotten, and on the ends of the main roots around the collar, and in some cases on the stem, a smooth, reddish-brown sheet of fungus is present beneath the bark. This disease can be controlled by the same methods recommended for the black root rot.

The third disease is called stem canker, although it is primarily a root disease. The symptoms are somewhat similar to those described for the other diseases, but the roots show the presence of peculiar open splits in the bark, which are bordered by a vigorous development of callus. The cause of this disease appears to be physiological, and is attributed to heavy clay soils difficult to drain. For its control it is recommended that better drainage be provided and that wind-breaks should be erected around the plantations.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Game laws for 1911, H. Oldys, C. E. Brewster, and F. L. Earnshaw (*U. S. Dept. Agr., Farmers' Bul. 470, pp. 52, figs. 2*).—This bulletin, which presents a summary of the game laws for 1911, relating to seasons, shipments, sale, limits, and licenses, is similar in scope to those issued annually since 1902 and includes changes in the laws made during the present year. In the section relating to legislation of the year a brief comprehensive review is given of the new laws.

Bubonic plague, with special reference to that of ground squirrel origin, G. W. McCoy (*Jour. Amer. Med. Assoc., 57 (1911), No. 16, pp. 1268–1270*).—A paper presented at the annual meeting of the American Medical Association in June, 1911.

A monograph of the broad-winged hawk (Buteo platypterus), F. L. Burns (*Wilson Bul., 23 (1911), No. 3–4, pp. 143–320, pls. 10, fig. 1*).—A work prepared in cooperation with more than 100 American ornithologists. A bibliography of the world's literature of the species, consisting of 37 pages, is included.

The English sparrow as an agent in the dissemination of chicken and bird mites, H. E. EWING (*Auk, 28 (1911), No. 3, pp. 335–340, figs. 2*).—On the basis of observations made in Illinois, the author concludes that the English sparrow frequently harbors and is the host of the chicken mite, *Dermanyssus gallinæ*. Sparrows become repeatedly inoculated with these mites because of their habit of lining their nests with poultry feathers, and sparrow nests, when built in the vicinity of chicken roosts, upon becoming deserted may leave hundreds or thousands of lice to infest new poultry houses, even at considerable distances. The English sparrow likewise harbors and is the host of the bird mite, *D. avium*.

Handbook of pathogenic protozoa, edited by S. VON PROWAZEK (*Handbuch der Pathogenen Protozoen. Leipsic, 1911, pt. 1, pp. 117, pls. 3, figs. 76*).—The papers presented in this first part of the work include a brief introduction by R. Nocht; The Fixation and Staining of Protozoa (pp. 6–40), by G. Giemsa; Classification of Protozoa (pp. 41–49) and The Dysentery Amœbæ (pp. 50–66), by M. Hartmann; *Entamœba coli* (pp. 67–77), by H. Werner; Flagellates (Trichomonas, Lamblia) (pp. 78–97), by E. Rodenwaldt; and *Costia necatrix* (pp. 98–100) and The Genus Trypanoplasma (pp. 101–117), by E. Neresheimer.

Bibliographies are appended to each paper.

Concealing-coloration in the animal kingdom, G. H. THAYER (*New York, 1909, pp. XIX+260, pls. 73, figs. 3*).—An exposition of the laws of disguise through color and pattern, being a summary of A. H. Thayer's discoveries. Three of the 27 chapters, including 9 plates, deal with the subject as related to insects.

An annotated list of the literature on insects and disease for the year, 1910, R. W. DOANE (*Jour. Econ. Ent., 4 (1911), No. 4, pp. 386–398*).—A classified list of the more important literature issued during the year 1910.

Mechanical determination of the resistance of cereals to diseases and to the attacks of insects, R. SARCIN (*Defense Agr. et. Hort. [Amiens], 8 (1911), No. 334, pp. 230, 231; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, pp. 938, 939*).—Investigations made with several varieties of wheat in 1910 show that their susceptibility to the attack of larvæ of the oscinid fly *Chlorops tæniopus* stands in inverse ratio to the hardness of the stems, and the thickness of the cortical layer and of the external wall of the epidermal cells.

The enemies of the raspberry, P. NOEL (*Bul. Lab. Régional Ent. Agr. [Rouen], 1911, No. 23, pp. 4–9; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1190, 1191*).—A list is given of some 115 insect enemies of the raspberry.

Concerning some enemies of the olive Phlœothrips, G. DEL GUERCIO (*Redia, 7 (1911), No. 1, pp. 65–70, figs. 2*).—A preliminary note in which the author mentions a chalcidid parasite, a bacterial disease, and several predators as enemies of *P. olea*.

The enemies of the hazel tree, P. NOEL (*Bul. Lab. Régional Ent. Agr. [Rouen], 1911, No. 23, pp. 10–15; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, p. 1194*).—The author lists 108 insect enemies of the hazel.

Uganda insect pests, C. C. GOWDEY (*Cotton Dept. [Uganda] Ent. Leaflet 2, 1909, pp. 23*).—A review of this paper has been noted previously (E. S. R., 23, p. 53).

A bacterial epizootic among locusts in Mexico, F. H. D'HERELLE (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 21, pp. 1413–1415; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, p. 1178*).—Early in 1910 the author observed a severe outbreak of disease among locusts

(*Schistocerca pallens*) in Yucatan. Numerous coccobacilli were found in the intestines of all the dead locusts examined, but the organism could not be detected in locusts captured while in flight and belonging to swarms in which the disease prevailed. Its cultural characteristics, etc., are described together with ingestion experiments which prove it to have been the cause of the epizootic. In inoculation experiments it was found to be nonpathogenic for hens, guinea pigs, and rabbits. According to the information received by the author from Yucatan planters, the number of locusts had so greatly diminished by March, 1911, that it was estimated that the damage caused would be very slight. The author suggests a possible usefulness for this organism in controlling locusts in other countries.

Destruction of the locust, J. GUELFREIRE (*La Destruccion de la Langosta. Mexico: Govt., 1911, pp. 34, pls. 10*).—An account by the Mexican Consul General of locust destruction in Argentina.

Combating locust invasion in the Karst plateau region, F. GVOZDENOVIĆ (*Monatsh. Landw., 4 (1911), No. 1, pp. 12–24, figs. 10*).—An account of the invasion of some sections of the Department of Görz and Gradiska, Austria, in 1909, together with the measures used in combating it. An outbreak of disease due to *Empusa grylli* took place toward the end of June and destroyed large numbers of *Caloptenus italicus* and lesser numbers of species of other genera.

Studies of the parthenogenetic cycle of Heliothrips hæmorrhoidalis, P. BUFFA (*Redia, 7 (1911), No. 1, pp. 71–109, pls. 3*).—Following a brief introduction, the author reviews the literature relating to this thrips in connection with a bibliography of 42 titles. A detailed account is then given of studies made of its life history, bionomics, and geographical distribution.

The hawthorn aphis (Aphis cratægi) as an enemy of apple trees, G. LÜSTNER (*Geisenh. Mitt. Obst. u. Gartenbau, 26 (1911), No. 5, pp. 71, 72; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, p. 1192*).—An account is given of injury to apple trees in various parts of Germany by *A. cratægi*.

Organized efforts as a factor in the control of the citrus white fly, A. W. MORRILL (*Jour. Econ. Ent., 4 (1911), No. 4, pp. 363–375*).—This is an extended discussion based on a general knowledge of citrus conditions in the Gulf Coast States, gained by the author more particularly while connected with the U. S. Department of Agriculture in the white fly investigations.

The cotton white scale ("piojo blanco") in Peru, C. H. T. TOWNSEND (*Bol. Dir. Fomento [Peru], 8 (1910), No. 9, pp. 7–16; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, p. 748*).—Of the insect enemies of the cotton white scale (*Hemichionaspis minor*) that have been introduced into Peru, *Prospaltella aurantii* and *Aspidiotiphagus citrinus* are said to be the most beneficial.

A contribution to the knowledge of the Coccidæ of Argentina, G. LEONARDI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 5 (1911), pp. 237–284, figs. 27*).—Two genera, namely, Protargionia and Dinaspis, and 25 species representing the subfamilies Monophlebinæ, Ortheziinæ, Dactylopiinæ, Tachardinæ, Coccinæ, and Diaspinæ, are described as new to science.

Diaspis pentagona, G. GASTINE (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), Nos. 4, pp. 432–456; 5, pp. 568–578*).—A detailed account of *Aulacaspis (Diaspis) pentagona*, its host plants, preventive and remedial measures, the status of the pest in Italy, etc.

Plants attacked by Diaspis pentagona (*Bol. Min. Agr., Indus. e Com. [Rome], Ser. A, 10 (1911), II, No. 10, p. 314; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, pp. 968,*

969).—A list is given of 39 plants recognized as hosts of the mulberry, or West Indian peach scale (*Aulacaspis* [*Diaspis*] *pentagona*).

A note on the lac insect (Tachardia lacca), its life history, propagation, and collection, E. P. STEBBING (*Indian Forest Mem., Forest Zool. Ser., 1 (1910), No. 3, pp. 82, pls. 4*).—A revision of the paper previously noted (E. S. R., 20, p. 460).

A newly-imported scale pest on Japanese hemlock, C. L. MARLATT (*Ent. News, 22 (1911), No. 8, pp. 385–387, pl. 1*).—*Aspidiotus* (*Diaspidiotus*) *tsugæ* on Japanese hemlock (*Tsuga* sp.) from stock imported from Japan, during the course of quarantine work in New Jersey, is described as new to science.

The fig moth, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Bul. 104, pp. 1–40, pls. 4, figs. 4*).—While the fig moth (*Ephestia cautella*) has been known in this country as a pest since 1897, at which time a short preliminary paper was published by the author (E. S. R., 9, p. 852), it was not until 1908 that the insect attracted any great attention. It had by that time, however, invaded mills of various kinds, including rice mills in the Southern States, and in these situations it is now quite a serious pest. In 1909 and 1910 thousands of dollars worth of imported figs were condemned under the Food and Drugs Act as infested.

In this article the author deals primarily with the insect as a pest in stored products in America. Descriptions are given of the stages of the pest, the literature and history of the species in Europe and America is reviewed, and an account is given of its geographical distribution and food habits. Inspections made of 30 samples of Smyrna figs from various sources are reported upon, showing much variation as to the amount of infestation. The average infestation of Smyrna figs entering the port of New York was computed in 1909 and 1910 by the Bureau of Chemistry of this Department as from 24.05 to 38.17 per cent.

In studying the biology of this pest, some 48 days were found to be required for the emergence of adults from eggs deposited in flaxseed meal on April 14. Adults emerged in 36 days from eggs deposited in corn meal about June 23. Eggs laid during the night of July 13 were found to have hatched on the morning of July 17, giving a period for the egg state of not more than 3½ days. The pupal period was found to vary from 8 days, when kept at a temperature of 83° F. to 24 days, when exposed to cool weather in October. The author's observations have led him to deduce the following periods: For the egg from 3½ to 14 days; larva, from 13 to 30 days; pupa, from 8½ to 24 days; and life cycle from 36 to 48 days.

Two parasites, *Hadrobracon hebetor* and *Omorga frumentaria*, and the mite *Pediculoides ventricosus* are recorded as natural enemies. Methods of control, including experiments with fumigants at a high temperature, by the author and T. H. Jones, are discussed. The measures applicable in eradicating the pest in imported figs are summarized in the following methods of prevention and destruction: Prompt disposal or destruction of the useless June fig crop; covering the figs at night while on the "serghi"; closely screening the fig depots in the interior; prompt delivery of the figs to the packing houses (khans) after gathering; destruction of the worms in the "khans" by sterilization through the use of hot water, dry heat, or steam; fumigation by means of carbon bisulphid or hydrocyanic-acid gas; construction of "khans" so that they can be made gas tight for the purpose of fumigating; enactment of special regulations or legislation to secure the enforcement of the suggestions made; and clean methods of handling and storing at all times and in all places.

A bibliographical list of 18 titles is appended.

Report on the fig moth in Smyrna, E. G. SMYTH (*U. S. Dept. Agr., Bur. Ent. Bul. 104, pp. 41–65, pls. 12*).—This is a report of investigations made in Smyrna.

In observations of the percentage of infestation on the "serghi", that is, beds of reeds or other suitable plants laid upon the ground to protect figs from contact with the soil while drying, the author found that an exposure of one night resulted in an infestation of 29 per cent, whereas 2 nights resulted in 38½ per cent, and 3 nights 44.5 per cent becoming infested. The moths were found to be more abundant in the fig depots than outside over the "serghi."

"Infestation of the figs begins in or near the orchards in the interior of Asia Minor, before the dried fruit has reached Smyrna to be packed. Out of 100 worm-infested figs, the larvæ in possibly 5 to 10 per cent of them might be traced to the tree, while the other 90 to 95 per cent of the larvæ develop from eggs laid either while the figs are on the 'serghi' or in the fig depots of the villages. The number of larvæ originating from eggs laid while the figs are in freight cars en route to Smyrna, in the packing 'khans' of Smyrna, or in the holds of steamers en route to America, is inconsiderable."

Methods of control are considered at some length. As related to prevention the author emphasizes as 4 very important measures those noted above as to the disposal of the June crop of figs; the covering of the figs at night while on the "serghi"; the screening of the fig depots; and the prompt delivery of the figs to the "khans." As regards the destruction of the fig moth larvæ in the "khans," it remains for packers to demonstrate by actual experience whether the use of steam, hot water, or dry heat is the most practical, experiments having shown that each has its advantages and is capable of eradicating the larvæ under proper conditions.

Papers on insects affecting vegetables.—The Hawaiian beet webworm (Hymenia fascialis), H. O. MARSH (*U. S. Dept. Agr., Bur. Ent. Bul. 109, pt. 1, pp. 15, pl. 1, figs. 2*).—This account is based upon studies conducted in the Hawaiian Islands during the latter half of 1910.

H. fascialis is said to be such a serious pest of sugar beets in Hawaii that unless controlled the crop probably can not be profitably grown. The food plants of this species in Hawaii include table beets, sugar beets, mangel-wurzels, several species of Amaranthus, Euxolus, purslane (*Portulaca oleracea*), cucumbers, and chenopodiaceous weeds. Among the wild food plants, Amaranthus is the favorite. These weeds grow in abundance along fences and in neglected spots, and it frequently happens that the plants are so completely stripped of foliage that large patches of them die. Cultivated Amaranthus is likewise severely damaged.

This webworm can be found throughout the year in all stages of development. The eggs are deposited in large numbers along the midrib and larger veins, as many as 40 having been counted on a single beet leaf. The young larvæ, which hatch out as soon as 4 days, feed on the lower surface of the leaves and, except when nearly mature, consume only the surface. The larvæ, which in some cases spin light webs under which they rest, reach maturity under normal conditions in from 9 to 13 days. "They then leave the plants, burrow slightly beneath the surface, and form firm, compact, oblong cocoons of webbed-together grains of earth. . . . They usually pupate about 2 days after entering the soil, and the adults issue from 7 to 13 days later, thus completing a generation in from 22 to 31 days. . . . The climate of Hawaii is so equable that this pest is enabled to breed continuously, and it is possible that 10 to 12 generations might be produced annually." The author's observations indicate that the female is capable of depositing at least 100 eggs. Three species of hymenopterous para-

sites were reared, namely, *Limnerium hawaiiense*, *Cholonus blackburni*, and *Cremastus hymeniæ*.

Experiments with insecticides in which Paris green and lime, Paris green and whale-oil soap, arsenate of lead and molasses, lime-sulphur solution, and lead chromate were used, are briefly reported. They show that this pest can be controlled by Paris green when applied at the rate of 2 lbs. in 100 gal. of water and that this strength will not burn beet foliage. It was found better in this formula to omit the use of lime and use whale-oil soap, since the soap serves as an effective adhesive agent and when it is used the poison is very evenly distributed over the leaf surface. Tests of lead chromate indicate that it has good points and should be given a more thorough trial. A formula consisting of nicotin sulphate 1 fluid ounce, whale-oil soap 4 oz. and water 4 gal., which was successfully used by the author at Honolulu in controlling the common cabbage worm, the larva of the diamond-back moth, a looper (*Autographa precationis*), and the beet army worm (*Caradrina exigua*), is recommended for use in combating this pest on spinach.

Technical descriptions of the earlier stages are given by H. G. Dyar (pp. 11, 12). A compilation of the description and synonymy of this species, an outline of its distribution and history, and a bibliography, by F. H. Chittenden (pp. 12–15), are presented in an appendix.

Papers on insects affecting vegetables.—The southern beet webworm (Pachyzancla bipunctalis), F. H. Chittenden (*U. S. Dept. Agr., Bur. Ent. Bul. 109, pt. 2, pp. 17–22, fig. 1*).—This pest is shown to have been the source of injury to table beets in the vicinity of Wichita Falls and Brownsville, Tex., and at Dade City, Cutler, Miami, and Boynton, Fla. It has also been observed working in colonies on the foliage of pigweed (*Amaranthus retroflexus*), spiny amaranth (*A. spinosus*), and spinach in the vicinity of Brownsville, Tex., and on the first mentioned at Miami, Fla.

Miscellaneous notes on its biology and technical descriptions of its stages are presented. The species is said to be of tropical origin and inclined to be cosmopolitan in any country suited to it climatologically. The National Museum collections contain material from Pernambuco, Bonito Province, Brazil, as well as from Georgia, Texas, Florida, and the District of Columbia, and it has been recorded from the West Indies and South Africa.

The tachinid fly *Phorocera erecta*, an ichneumonid of the genus Amorphota, and a species of Bracon have been reared from this pest. Several associated insects are mentioned, including the Hawaiian beet webworm (*Hymenia* [*Zinckenia*] *fascialis*), above noted, which was reared at Cutler, Fla., in March, 1909; an agromyzid fly reared from material collected on beets and Amaranthus at Boynton, Fla.; and the anthomyiid fly *Pegomya ruficeps*.

Paris green used at the rate of 1 lb. to 75 to 100 gal. of water, also recommended for use against the garden webworm (*Loxostege similalis*), will control the pest.

Grapevine pests: The grapevine sphinx, J. Feytaud (*Cult. Franc., 5 (1911), No. 14, pp. 5, 6; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, p. 1191*).—*Deilephila elpenor* feeds on the leaves of the grapevine and attacks various other plants, including willow-herb, bed straw, purple loosestrife, fuchsia, etc. Among its parasites mentioned are ichneumons of the genera Anomalon, Cryptus, Ichneumon, etc., also *Doria concinnata*, *Micropalpus comptus*, and *Hæmithacca erythrostoma*.

Concerning bacterial diseases of the bee moth (Galleria melonella), S. Metalnikov (*Ztschr. Wiss. Insektenbiol., 7 (1911), No. 5–6, pp. 178–181*).—The author finds that while the caterpillar of the bee moth possesses an exceptional immunity against tubercle (the fish type excepted), paratyphoid, sausage poison-

ing, and symptomatic anthrax bacilli, etc., and the trypanosomes of nagana and dourine, they succumb to the glanders and mouse typhoid bacilli and to certain nonpathogenic species, such as the hay bacillus (*B. subtilis*), when these are injected into the body cavity. Caterpillars infected with the fish tubercle bacilli died within 2 or 3 days after inoculation.

During the last 2 years the author has from time to time observed diseased caterpillars and in 2 instances epizootics that destroyed nearly all the caterpillars that were being bred for experimental purposes. In searching for the causative agent of these epizootics, 2 associated micro-organisms were met with, one a motile rod, the other a coccus. Both grew well in bouillon and gelatin and round white colonies were formed on solid media. The rod form was the more virulent, caterpillars injected with small quantities of it succumbing in from 2 to 4 hours when kept at 37° C. Inoculations of the coccus caused their death in from 15 to 20 hours. Neither the placing of healthy caterpillars with those suffering from the disease nor the feeding of cultures of the 2 organisms mixed with small pieces of beeswax produced the disease. Thus the manner in which infection takes place in nature was not determined.

The reduction of domestic mosquitoes, E. H. Ross (*London, 1911, pp. X+114, pls. 13, figs. 2; rev. in Science, n. ser., 34 (1911), No. 885, pp. 842–844*).—This book furnishes instructions for the use of municipalities, town councils, health officers, sanitary inspectors, and residents in warm climates.

On the varieties of Bacillus coli associated with the house fly (Musca domestica), W. Nicoll (*Jour. Hyg. [Cambridge], 11 (1911), No. 3, pp. 381–389*).—"A study of the natural bacterial flora of the house fly appears to be essential in forming a correct estimate of the part played by flies in transmitting pathogenic bacteria. The house fly may carry at least 27 varieties of *B. coli*, by far the most frequent of which are *B. coli communis* and MacConkey's bacillus No. 71. As far as can be judged from the character of these colon bacilli the house fly derives its bacterial flora equally from excremental matter and from other sources. Certain nonlactose fermenting bacilli appear to be capable of multiplying in the intestine of the house fly. Of these Morgan's bacillus No. 1 is a not infrequent inhabitant of the fly's intestine and *B. paratyphosus* B has been found on 2 occasions."

On the survival of specific micro-organisms in pupæ and imagines of Musca domestica raised from experimentally infected larvæ. Experiments with Bacillus typhosus, J. C. G. Ledingham (*Jour. Hyg. [Cambridge], 11 (1911), No. 3, pp. 333–340*).—"Although typhoid bacilli were liberally supplied to larvæ of *M. domestica*, all attempts to demonstrate *B. typhosus* in the pupæ or imagines were unsuccessful, until recourse was had to disinfection of the ova. After this preliminary disinfection both larvæ and pupæ gave pure growths of *B. typhosus* but hitherto it has not been possible to examine the imagines. . . .

"From the practical point of view the main conclusion to be drawn from the experiments detailed in this communication is that the typhoid bacillus can lead only a very precarious existence in the interior of larvæ or pupæ which possess, at least in so far as these investigations warrant, a well-defined bacterial flora of their own. Even under the highly artificial conditions of the final series of experiments, it was not possible to decide whether the *B. typhosus* though recoverable from the pupa was really actively multiplying in the pupal interior or gradually dying out. There was some indication that the latter was the case, as the typhoid colonies recovered from the pupa in the one successful instance were extremely few in number, while the larvæ which had been feeding on *B. typhosus* contained enormous numbers as evidenced both by cultural and microscopical examination."

An egg parasite of the codling moth belonging to the family Mymaridæ, A. A. GIRAULT (*Canad. Ent., 43 (1911), No. 4, pp. 133, 134*).—*Anaphes gracilis*, originally described as a parasite of the oyster-shell scale, is recorded as having been bred from eggs of the codling moth at Tallapoosa, Ga.

Observations on mites infesting the horn fly, Hæmatobia serrata, S. HADWEN (*Canad. Ent., 43 (1191), No. 5, pp. 141, 142, pl. 1*).—The author records observations made at Duncans, British Columbia, in July, 1910, in which 94 of 118 horn flies examined were infested with mites (*Pigmcophorus americanus*). The number of mites found on a fly varied from 4 or 5 to large numbers. Later in the season, the mites were found in other parts of British Columbia.

Another account of the food habits of the olive fly, G. MARTELLI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 73–104, figs. 9*).—Further biological studies are presented (E. S. R., 22, p. 59).

Experiments in 1910 against the olive fly, A. BERLESE (*Redia, 7 (1911), No. 1, pp. 111–155, pls. 2; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 753, 754*).—Experiments conducted in olive groves in Apulia and near Orbetello in the Tuscan Maremma are reported.

In the first-named place, experiments were made with a fly-poisoning mixture, diluted with water, while vessels containing the undiluted mixture were used in Maremma. "The experiments in Apulia showed (1) the decided attraction which water has for the fly if pots containing water are within the olive groves during hot days and in districts where there is little moisture, as in Southern Italy; (2) the absolute inefficacy, as far as the fly is concerned, of general spraying of the olive groves in July with fly-poisoning mixtures. The experiments in Maremma showed that the mixture used, although made with abundant fruit paste and kept in a sirupy state, had no attraction for the fly, and in all probability, no useful effect for the olives."

The author emphasizes the fact that it is not the presence of sugar in the mixtures which is of importance in the control of the fly but rather that of the water, and more particularly of sea water. Vessels containing the liquid should be placed in the olive groves in May and left until all danger from the fly has passed. Sprayings are thought to be useless at least for districts with climatic conditions as in Apulia. The experiments show that spraying with sugar mixture causes a strong development of sooty mold on the trees. "The use of vessels placed throughout the olive groves, in the minimum proportion of 2 per hectare, and kept full of sea water or fresh water, is very efficacious at least in Southern Italy. But the treatment must be quite general and simultaneous on the part of all the olive growers of a district, unless the olive groves are separated from one another by distances of several kilometers."

The photography of Diptera, W. M. GRAHAM (*Bul. Ent. Research, 2 (1911), No. 2, pp. 153–160, figs. 2*).—A somewhat detailed account of the methods which the author has found to be most successful in photographing insects.

Ceratophyllus silantiewi, Wagner; a plague flea, N. C. ROTHSCHILD (*Ent. Mo. Mag., 2. ser., 22 (1911), No. 258, p. 141*).—The author has received specimens of this little known flea, which were captured on the frontier of Siberia and Manchuria early in 1911 from "tarabagans" (*Arctomys bobac*), a rodent known to suffer from epidemics of plague. It is stated that the recent epidemic of plague in Manchuria started among the Chinese hunters of these animals in Mongolia.

An epidemic of fungus diseases among soldier beetles, C. H. POPENOE and E. G. SMYTH (*Proc. Ent. Soc. Wash., 13 (1191), No. 2, pp. 75, 76*).—The authors report that numerous adults of the soldier beetle *Chauliognathus pennsylvani-*

cus attacked by a fungus disease were observed September 25, 1909, on the blossoms of a Eupatorium (probably *perfoliatum*) at Diamond Springs, Va.

"The fungus seemed to attack first the abdomen of the adult, distending it abnormally, and producing white, greenish, or grayish rings of dense mycelial growth on the thin membranous body-wall between the segments. Often 6 or more beetles had attached themselves in their death struggle to a single small head of flowers."

There is said to be little doubt but that the fungus responsible for the death of these beetles is identical with that described by R. Thaxter as *Empusa* (*Entomophthora*) *tampyridarum* from diseased adults of *C. pennsylvanicus* observed by him at Collowhee, N. C. "In June of the previous year a similar epidemic of fungus among the related *C. marginatus* was observed, first by the senior author, and afterwards independently by F. H. Chittenden, on the experiment station farm at Norfolk, Va."

Attention is called to the fact that in the larval stage the food of the various species of Chauliognathus is composed of various small, soft-bodied insects, largely aphids and other forms living near the ground. Since the usual great abundance of these beetles no doubt acts as a check to the increase of several species of injurious aphids, such as the pea aphis (*Macrosiphum pisi*), the 2 species of Chauliognathus mentioned are thought to be of distinct economic value.

The potato stalk borer, W. F. McSparran (*N. Y. Tribune Farmer, 10 (1911), No. 516, p. 18*).—It is stated that in the potato district of Pennsylvania about Furniss injury by the potato stalk borer in 1911 amounted to thousands of dollars.

The preservation of aphis-eating lady beetles. A new application of cold (*Rev. Gén. Froid, 3 (1911), No. 3, pp. 232–234; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1179, 1180*).—This is an account of work with coccinellids being carried on by the California Horticultural Commission.

The orange-yellow coffee borer, Nitocris usambicus, H. Morstatt (*Pflanzer, 7 (1911), No. 5, pp. 271–276, pl. 1, fig. 1*).—The author finds that in addition to the white coffee borer, *Anthores leuconotus*, which is widely distributed in South Africa and has for years been known to be a source of injury, a second borer (*N. usambicus*) is implicated in the injury to coffee trees. This paper gives descriptions of its stages and accounts of its injury, life history so far as known, and remedial measures.

On some undescribed Scolytidæ of economic importance from the Indian Region, II, E. P. Stebbing (*Indian Forest Mem., Forest Zool. Ser., 1 (1909), No. 2, pp. 20, fig. 1*).—This continuation of the paper previously noted (E. S. R., 21, p. 247) includes descriptions of 15 species new to science.

Some factors influencing the development of the boll weevil, W. D. Pierce (*Proc. Ent. Soc. Wash., 13 (1911), No. 2, pp. 111–114*).—A brief discussion of the influence of temperature, humidity, texture of food, etc., on the development of the cotton boll weevil.

A handbook of bee keeping, E. Zander (*Handbuch der Bienenkunde in Einzeldarstellungen. Stuttgart, 1910, vol. 1, pp. 31, pls. 4, figs. 8; 1911, vols. 2, pp. 42, pls. 8, figs. 13; 3, pp. VIII+182, pls. 20, figs. 149*).—The first volume of this work deals with foul brood and methods of combating it; the second with diseases and enemies of immature bees; and the third with the anatomy and histology of the bee.

Apiculture in Tunis, J. Georges (*Bul. Dir. Gén. Agr. Com. et Colon. Tunis, 14 (1910), No. 57, pp. 448–475, pls. 2, fig. 1; 15 (1911), No. 58, pp. 74–107, pl. 1, map 1*).—This account includes tabulated data for 1909 on the number of bee

keepers and hives, and the amount and value of comb and honey produced in the various sections of Tunis.

The chalcidoid parasites of the coccid Kermes pubescens, with descriptions of two new genera and three new species of Encyrtinæ from Illinois, A. A. GIRAULT (*Canad. Ent., 43 (1911), No. 5, pp. 168–178*).—*Cristatithorax pulcher* and *Enasioidea latiscapus*, representing new genera and species, and *Microterys speciosissimus* n. sp. are recorded as reared from *K. pubescens* on oak at Urbana, Ill.

Notes on the breeding of Tropidopria conica, G. E. SANDERS (*Canad. Ent., 43 (1911), No. 2, pp. 48–50, fig. 1*).—About 40 per cent of the puparia of *Eristalis tenax*, collected under natural conditions at Ottawa in August and September, 1910, was found to be parasitized by the proctotrypid *T. conica*. The largest number of adults bred from a puparium was 46, the lowest 21, with an average of 35.

Field work in the control of the Argentine ant, L. J. NICKELS (*Jour. Econ. Ent., 4 (1911), No. 4, pp. 353–358*).—Control operations carried on at Berkeley, Cal., where 2 small, isolated colonies of Argentine ants have become established, are described. The results obtained have been very satisfactory thus far, it having been found possible to exterminate this pest and to prevent absolutely its spread.

Notes on a sawfly injurious to ash, E. R. SASSCER (*Proc. Ent. Soc. Wash., 13 (1911), No. 2, pp. 107, 108, pl. 1*).—Notes on the life history and bionomics of *Tomostethus multicinctus*, which for several seasons has defoliated white ash in certain sections of Washington, D. C., are presented. Observations for 4 successive years show this sawfly to be single brooded.

A new enemy of the mulberry tree (*Villaggio, 36 (1911), No. 1822, p. 254; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, p. 1194*).—The red spider *Tetranychus pilosus* is reported to have become the source of injury to the mulberry in the Trento district of Italy.

The Rocky Mountain spotted-fever tick, with special reference to the problem of its control in the Bitter Root Valley in Montana, W. D. HUNTER and F. C. BISHOPP (*U. S. Dept. Agr., Bur. Ent. Bul. 105, pp. 47, pls. 3, figs. 3*).—This is a detailed account of studies commenced in 1908 and conducted in cooperation with the Biological Survey of this Department and the Montana Experiment Station. Reports by the Biological Survey (E. S. R., 25, p. 756) and the Montana Station (E. S. R., 26 p. 63) have been previously noted, as has a circular relating to the geographical distribution of this tick (E. S. R., 25, p. 59).

The seasonal history and habits of *Dermacentor venustus* are dealt with at some length. In lesser altitudes and at the southern limit of the range of the species, activity may begin as early as the middle of February, while in the Bitter Root Valley, it is probable that the ticks seldom become active in numbers before nearly the middle of March. It has been determined that the adults collected on vegetation during the spring months may survive for a period of 413 days without food. Fertilization takes place on the host, and in from 8 to 17 days the females engorge and drop. Deposition may begin as soon as the seventh day after dropping, and all of the eggs, which usually number about 4,000, are deposited within a period of 30 days. In the Bitter Root Valley the period required for incubation ranges from 34 to 51 days, the longer period occurring in the early spring months. At Dallas, Tex., eggs hatched as early as 15 days after deposition, the longest incubation period being 41 days.

During the summer months all of the larvæ hatching from a mass of eggs usually die within 1 month after the first eggs hatch; in one instance, however, a period of 117 days elapsed from the beginning of hatching of the eggs until the death of the last larva. Those larvæ which succeed in finding an animal engorge and drop from the host between the third and eighth days; from 6 to 21 days then pass before they molt. Unfed nymphs have been found to survive a period of more than 300 days. The nymphs, which require from 3 to 9 days for engorgement, emerge from about the middle of July to the beginning of cold weather. Some of the nymphs which transform during the summer find hosts and engorge. A few of these are thought to molt to adults before cold weather begins, these individuals being the only ones which complete their life cycle in a single season.

Those larvæ which hatch from eggs deposited by females that do not find hosts until late in the spring become engorged during July and August and do not molt to nymphs until shortly before winter. These nymphs begin to appear in the spring, shortly after the adult ticks become active, the last individuals not securing hosts until early in July. These individuals molt to adults during the latter part of the summer, and the resulting adults pass the winter before feeding. Thus it appears that although a few of the ticks may complete their life cycle, from nymph to nymph, or adult to adult, during one season, the majority require 2 years.

In considering the host animals of these ticks, tables are given which show the results of examinations made of wild mammals in the Bitter Root Valley during 1910 and 1911, with the number and stages of *D. venustus* found thereon, and of the animals on which *D. venustus* has been found in the adult stage. Other species of ticks found in regions where Rocky Mountain spotted fever occurs, species of ticks which might play an important part in the dissemination of the disease should it be introduced into new regions, and the practical control or eradication of the spotted-fever tick are considered at some length.

Under methods of destroying this tick the authors discuss dipping, including details of vat, construction, handwork, etc. The necessity for expert supervision in the work of controlling this tick is emphasized.

A bibliography of the more important writings on the spotted fever tick, consisting of 28 titles, is appended.

The life history of a parasitic nematode (Habronema muscæ), B. H. Ransom (*Science, n. ser., 34 (1911), No. 881, pp. 690–692*).—This nematode parasite of the house fly, first reported by Carter from Bombay, India, in 1861, was recorded by Leidy in 1874 as occurring in 20 per cent of the house flies examined at Philadelphia. During the summer of 1910 the author found it to be fairly common in house flies caught at Washington, D. C., and in 1911 to be commonly present in house flies in Colorado and Nebraska.

Investigations which led to examinations of the stomachs of 2 horses in 1911 resulted in the finding of a complete series of stages in the development and growth of this parasite from larva to adult. The embryos, which are excreted in the feces, enter the bodies of fly larvæ, developing therein from eggs deposited by house flies. "During the development of the fly larvæ and pupæ, the worms with which they have become infested also undergo a process of growth and development, reaching their final larval stage at about the time the flies emerge from the pupal state. Further development of the worms waits upon the swallowing of the infested flies by a horse, in which event the life cycle becomes completed by the growth of the worms to maturity."

The author suggests that a practical application may be made of this knowledge through its affording a means of determining with some degree of accuracy the proportion of flies in a given locality which find their breeding places in horse manure.

Vaporite as a means of destroying subterranean insects, H. VON FEILITZEN (*Fühling's Landw. Ztg., 60 (1911), No. 5, pp. 169–174*).—In field experiments conducted with larvæ of the elaterid beetle *Agriotes lineatus* and the cabbage maggot (*Phorbia* [*Anthomyia*] *brassicæ*), vaporite proved ineffectual. In order to test the direct action, 5 wireworms were placed in a small glass cylinder that was filled with soil to a height of 20 cm., covered with 2 cm. of soil and above this was placed 10 cm. of soil containing a large proportion of vaporite. All the 5 wireworms were alive after a 24 hours' exposure, while others on which vaporite was placed were able to crawl away without showing signs of injury. The author also finds that under certain conditions, namely, when used in large quantities and poorly mixed, vaporite may injure the growth of cultivated plants.

The adhesion of insecticide mixtures of lead arsenate, H. ASTRUC, A. COUVERGNE, and J. MAHOUX (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 26, pp. 1860–1862*).—In order to determine the effect of age on the adhesiveness of lead arsenate, the authors applied mixtures, prepared from 1 to 20 days previous, to plates of glass and to foliage. After drying for 24 hours the samples on glass were exposed for ½ hour to a violent drenching in imitation of rain, their surfaces being on an incline of 15 to 20°; later they were exposed to the washing of heavy rains.

The tests led the authors to conclude that the age of a mixture of this insecticide affects its adhesion to the vine but slightly. In general, when applied to the vine, it was found that mixtures which had not been prepared for more than 5 days were nearly equivalent in adhesiveness, whereas those which had been prepared for from 10 to 20 days lost about one-fourth of the adhesive property.

Leakage of fumigation tents, C. W. WOODWORTH (*Jour. Econ. Ent., 4 (1911), No. 4, pp. 376–380, pl. 1*).—A discussion of the significance of the leakage factor in fumigation, with a view to developing a dosage system based upon the varying conditions of leakage tents found in actual operations in the field.

Pure insecticides, C. W. WOODWORTH (*California Sta. Circ. 73, pp. 2*).—This circular suggests terms for use in the more accurate specification of high grade insecticides. The California insecticide law permits any grade to be sold, only requiring a statement of its composition and providing that it shall not be lower than wthin 5 per cent of the percentage claimed on the label. A list is given of chemicals and crude drugs already registered and the percentages claimed.

Legislation in Canada in reference to injurious insects and plant diseases, C. G. HEWITT (*Jour. Econ. Ent., 4 (1911), No. 4, pp. 358–362*).—The text of the destructive insect and pest act of 1910, by which the Canadian Department of Agriculture is empowered to take such action as may be deemed necessary to prevent the introduction or spreading of injurious insects and plant diseases, is presented, together with the regulations promulgated.

[Establishment of a plant inspection service in France] (*Jour. Off. Répub. Franc., 43 (1911), No. 130, pp. 3808, 3809; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1198–1200*).—On May 1, 1911, the President of France issued the decree, here presented, establishing an inspection service consisting of entomological and phytopathological sections.

FOODS—HUMAN NUTRITION.

Influence of saccharin on the nutrition and health of man (*U. S. Dept. Agr. Rpt. 94, pp. 375*).—The report of the referee board of consulting experts is included, together with the results of investigations on which the conclusions are based.

Influence of saccharin on digestion, metabolism, nutrition, and general health, C. A. Herter (pp. 9–228).—The experiments on the effects of saccharin were made with 3 subjects under observation for from 129 to 164 days, and were divided into various periods. During the foreperiod no saccharin was taken. Five periods followed during which it was taken with the foods in increasing amounts beginning with 0.3 gm. daily and increasing to 1.5 gm. per day. An afterperiod followed during which no saccharin was taken. Clinical records were kept, the urine and feces were examined, the nitrogen balance was determined, and other similar experimental data were recorded, as well as the results of studies of the effect of saccharin upon enzyms. "In no case was any evidence obtained of any specific inhibiting action upon enzyms by saccharin or by its sodium salt. Such quantities of these substances as might be employed for sweetening food are unlikely to affect the normal physiological activity of the digestive enzyms." According to the author, "from a consideration of all the data bearing on the subject of the action of saccharin we have reached the conclusion that relatively large doses of saccharin (over 0.3 gm., and especially above 1 gm. daily), if continued for considerable periods of time (months), are liable to induce disturbances of digestion. On the other hand, small doses of saccharin (0.3 gm. or less) may be taken daily during long periods of time (months) by normal adults without any detriment to health ascertainable by the available methods of study.

"No evidence was attainable that the addition of saccharin to the food altered the quality or strength of the food. On the other hand, it is obvious that if saccharin be added to the food with intention of replacing glucose or some other foodstuffs, this must be regarded as a substitution involving the reduction of the food value of the sweetened product, and hence as a reduction in its quality."

The paper is followed by a collection of references to the literature of saccharin.

Effect of saccharin on the health, nutrition, and general metabolism of man, O. Folin (pp. 229–375).—Twelve young men were selected as subjects, of whom 7 drawn by lot received saccharin, while the other 5 served as controls. For a period of about 5 months the men given saccharin took it almost uninterruptedly with every meal in doses ranging from 0.05 gm. to 0.25 gm. at the end, the intake amounting therefore to from 0.15 gm. to 0.75 gm. per day. Particular attention was paid to gains and losses of body weight, the physical condition of the subjects, the character and constituents of the urine, bacteriological studies of the feces, and studies of gas production.

The author summarizes his work as follows:

"Considering the number of men involved, the length of the experiment, and the amounts of saccharin given, the negative character of the results obtained indicates that, so far as can be ascertained with methods at present available, saccharin in moderate doses is not injurious to the health of normal, sound adults."

The main conclusions of the referee board of consulting experts (pp. 3–8), based upon the above reports, were as follows:

"(1) Saccharin in small quantities (0.3 gm. per day or less) added to the food is without deleterious or poisonous action and is not injurious to the

health of normal adults, so far as is ascertainable by available methods of study.

"(2) Saccharin in large quantities (over 0.3 gm. per day and especially above 1 gm. daily) added to the food, if taken for considerable periods of time, especially after months, is liable to induce disturbances of digestion.

"(3) The admixture of saccharin with food in small or large quantities has not been found to alter the quality or strength of the food. It is obvious, however, that the addition of saccharin to food as a substitute for cane sugar or some other form of sugar must be regarded as a substitution involving a reduction of the food value of the sweetened product and hence as a reduction in its quality."

Edible fats and oils, W. H. SIMMONS and C. A. MITCHELL (*London, 1911, pp. VI+150+72, figs. 3*).—It has been the authors' purpose to describe the properties of different edible fats and oils and their combinations and to give an outline of modern processes used in their preparation and purification. The use of fat as food is discussed, as well as the analysis of raw materials and finished products, and statistics of the trade in edible oils are summarized.

Report to the local government board on inquiries in China and Siberia respecting pork and bacon exported to England, R. HAMILL (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1911, No. 16, pp. 15*).—In general the author's report, which is based on results of a personal investigation, is favorable. It appears that the Chinese pigs were being fed and slaughtered and marketed under good conditions. The details given would indicate that inspection is well carried out and that diseases are by no means general. With reference to the comparatively small percentage of Chinese pigs found to be affected with tuberculosis, the author points out that "it is antecedently improbable that tuberculosis of bovine origin would be common in Chinese pigs, as milk is very rarely used by the Chinese as an article of diet. . . . [Apparently milch cows were not kept in this region], and therefore pigs would not be fed, as in European countries, on refuse milk."

Considerable information is given regarding the breeds raised and the methods of fattening pigs and handling pork and incidentally regarding the use of pork as food in China.

Methods of fattening, handling, and inspecting pork in Siberia were also satisfactory in the main, in the author's opinion.

Adulterated truffle sausages, MEZGER and MÜLLER (*Pharm. Zentralhalle, 52 (1911), No. 28, p. 738; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 9, p. 524*).—Information is given regarding the character of the materials substituted for truffles in sausage.

The chemistry of hen's egg, K. KOJO (*Ztschr. Physiol. Chem., 75 (1911), No. 1–2, pp. 1–12*).—According to the analyses reported, egg white on an average contains 87.71 per cent water, 0.4 per cent ash, and 11.89 per cent organic substance, the total nitrogen content being 1.75 per cent. Grape sugar constituted 0.55 per cent of the total white, or 4.47 per cent of the dry matter. The liquid yolk contained 49.73 per cent water, 1.44 per cent ash, 2.49 per cent nitrogen, and 0.27 per cent grape sugar.

The fat content of sardelles and sardines, A. RÖHRIG (*Ber. Chem. Untersuch. Aust. Leipzig, 1910, pp. 13, 14; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 9, p. 524*).—On an average, the fat content of French and Brabant sardelles examined was 1.71 per cent, while that of sardines ranged from 7 to 10 per cent. In the author's opinion, determining the iodin number of the fat is not of much importance.

The nutritive value of fish and its physiological importance, W. CRONHEIM (*Der Nährwert der Fische und seine physiologische Bedeutung. Rostock, 1911, pp. 16*).—A general discussion.

Report to the local government board on the nutritive value of bread made from different varieties of wheat flour, J. M. HAMILL (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1911, No. 14, pp. 53, figs. 2*).—In this digest the author has brought together the results of earlier investigations and the results of milling tests, analyses of milling products, and other data, especially collected for the report. Quotations from his general summary, regarding the practical aspects of the question of the nutritive value of different sorts of bread, follow:

"The difference in nature and in nutritive value between breads made from the different classes of flour . . . do not appear to be of much importance to the average adult with whom bread is only one out of many varied constituents of his dietary. The notion, for example, that ordinary high grade and naturally white 'patent' flour is practically devoid of protein or nitrogenous constituents, whereas the latter are abundantly present in bread made from whole-meal and 'entire' wheat flours is erroneous. The differences which exist in this respect are not relatively of great magnitude, and they may, to a large extent, be neutralized by imperfect absorption from the digestive tract. Apart from this, there are commonly wider differences in protein content and energy value between 'patent' flours obtained from different wheats, than between the 'patent' flour of a given wheat and the corresponding whole-meal. . . .

"Relatively marked differences exist between different classes of flour, even when derived from the same wheat, in regard to their total mineral content or those substances which are represented by mineral matter in the ash. To the average adult living on a reasonably liberal and varied diet, however, these differences can not ordinarily be of importance.

"At the same time there is no doubt that some people who are accustomed to a mixed diet find, as a result of sufficient trial, that bread of one particular class—from 'patent,' 'entire' wheat, whole-meal, or 'germ' flour—suits them, individually, better than another. . . . No general rule can be laid down in such cases. The commercial supply of breads of all these classes serves a useful purpose by enabling a choice to be made."

Variety of diet is deemed much more desirable than to rely upon a diet consisting principally of bread, irrespective of the grade of flour. "This being premised, it may be said that there is no reason to consider that the varieties of bread which the miller and baker have accustomed us to regard as of lower quality—'households,' for example—are in any physiological sense inferior to that of the higher priced bread made from high grade and specially white flour. On the contrary, from the point of view of available nutrient material and energy value, the advantage is on the side of the 'households.'

"'Entire' wheat flours (including stone-ground flours and 'standard' flour) are in nearly the same position as 'households,' although when made from weak wheats they will usually contain less available protein than 'households' made from strong wheats. They possess, however, additional constituents, due to the presence of branny particles and the germ of the wheat, which appear to have a value of their own in nutrition, and may, as a result of further investigation, be shown to comprise phosphorus-containing organic compounds or other substances, the presence of which in some part of the dietary, even in minute quantity, is important in maintaining good health.

"The latter consideration applies also to the whole-meal flour, and to 'germ' flours. It is probable, however, that the comparative coarseness of bread made from the former, and its liability to produce digestive disturbances, would influence most people against its habitual adoption as a staple food. This objection does not apply to breads made from 'germ' flours, but these are, essentially, proprietary articles, and as their cost is distinctly greater than 'household' or 'standard' bread, those who have closely to consider the price of their bread might obtain better value, in respect of nutrition, by applying the difference in cost to the purchase of other food. . . .

"As to the choice of bread for children, the same considerations as to the dominating importance of a varied diet apply. For those, however, who live largely on bread, or bread supplemented only by jam, sugar, or other foods which add little to the available mineral matter, protein, organically combined phosphorus, or other substances which possibly may be necessary for health, there appears, on the balance, to be advantage in the use of bread made from flour of the 'entire' wheat class, or from whole-meal in which the bran is very finely ground. . . . It should, however, be remembered that many children whose food consists largely of bread, do not get enough of it, and are really underfed in respect of such essential nutritive substances as proteins and carbohydrates. To increase the quantity of bread taken in such cases may be of greater importance than the substitution of one form of bread for another; to supplement the bread by other articles (such as milk) which contain a material quantity of protein, mineral matter, and organically combined phosphorus, will be still more useful."

The nutritive value of flours, M. FLACK and L. HILL (*Brit. Med. Jour., 1911, Nos. 2646, pp. 597, 598; 2650, p. 949*).—Experiments with white rats fed so-called standard flour and a commercial brand of whole-wheat flour led the authors to conclude that the germ which is removed in milling white flour is of great importance. It is stated that the authors have prepared an extract from the offal of wheat, which, added to white flour, makes it more adequate as a food.

The results of feeding experiments on this question are promised.

[Phosphorus in flour], P. RENGNIEZ (*Thesis, School of Pharmacy, Paris, 1911; rev. in Rev. Sci. [Paris], 49 (1911), II, No. 6, pp. 176, 177*).—The different forms of phosphoric acid were determined in 18 samples of flour. Mineral phosphates were not found, the greater part of the phosphorus occurring in the form of Posternak's phospho-organic acid and nuclein. Flour made from the germ is the most rich in phosphorus. Bean flour contained about 1.4 gm. total phosphoric acid.

Many ways of cooking bananas (*London [1911], pp. 48, figs. 21*).—A collection of recipes for desserts and other dishes made from bananas.

Banana flour, KAPPELLER and A. GOTTFRIED (*Ber. Nahrmtl. Untersuch. Amt. Magdeburg, 1910, p. 16; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 3, p. 179*).—An analysis is reported.

Kra-kie and banana bread, M. MANSFIELD (*Jahresber. Untersuch. Aust. Nahr. u. Genussmtl. Allg. Österr. Apoth. Ver. Wien, 22 (1909–10), p. 4; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 3, p. 175*).—Banana bread, according to the author, does not contain more nutritive material than ordinary bread, while the digestibility of the protein content is lower. He does not consider that banana flour has any special value for baking purposes.

The origin and history of our garden vegetables and their dietetic values, G. HENSLOW (*Jour. Roy. Hort. Soc. [London], 34 (1908), No. 1, pp. 15–23; 36 (1910), Nos. 1, pp. 115–126, figs. 4; 2, pp. 345–357, figs. 6; 36 (1911), No. 3, pp.*

590–595, fig. 1; 37 (1911), No. 1, pp. 108–114, figs. 2).—A summary of data chiefly regarding the origin and use of vegetables.

Servian plum jam, W. Brunetti (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 7, pp. 408–411*).—Analyses are reported and discussed.

Cider vinegar, F. E. Mott (*Jour. Indus. and Engin. Chem., 3 (1911), No. 10, pp. 747–750, dgms. 2*).—A study of the relative amounts of levulose and dextrose in cider vinegar, with a description of an important method of determining this relation.

Changes in the acid content of vinegar when kept in casks, A. Behre (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 9, pp. 506–509*).—From his experiments, which covered 10 weeks, the author concludes that unless vinegar is very concentrated, the losses in acid content are very small when it is stored in containers with a small opening. Weaker vinegars do not change in acid content. If stored in open casks, the losses in acid content of concentrated vinegars are large, while with weak vinegars the acid content increases proportionately, owing to the evaporation of the water of the vinegars. With medium strong vinegar, the acid content does not change, although the vinegars decrease in volume about 60 per cent. This indicates that despite their different boiling points, water and acetic acid in such proportions as are found in medium strong vinegar evaporate equally.

Special principles of coffee infusion and the Thum process for purifying and improving coffee, E. Harnack (*München. Med. Wchnschr., 58 (1911), No. 35, pp. 1868–1872, figs. 2*).—According to the author, coffee exercises a harmful action upon the stomach and heart owing to volatile products produced in roasting. Coffee infusion has somewhat different physical properties from tea in that it is much more hypertonic and has a lower surface tension than water. Tea infusion is always hypotonic, has the same surface tension as water, and is without harmful effect on the stomach. The Thum process of handling coffee is described.

The ash content of capsicum, H. E. Sindall (*Jour. Indus. and Engin. Chem., 3 (1911), No. 10, pp. 753, 754*).—The author reports analytical data which leads him to conclude that the standard for total ash and acid-insoluble ash for capsicum should be raised to 7 per cent and 1 per cent, respectively.

Food control by police officials, W. Bremer (*Die Nahrungsmittelkontrolle durch den Polizeibeamten. Berlin, 1910, pp. IV+73*).—This is designed as a handbook for the instruction of police officers who collect samples for examination.

The pure food and weight and measure laws of the State of Iowa, effective July 4, 1911 (*Des Moines, 1911, pp. 12*).—The text of these laws is given.

Rules and regulations governing butcher shops and meat stalls (*Porto Rico: Dept. Health, Charities, and Correction, 1911, pp. 6*).—These rules are designed to insure a clean meat supply.

The essentials of food, D. Stewart (*London, 1911, pp. 182; rev. in Lancet [London], 1911, II, No. 14, p. 952*).—A popular text-book. The review calls attention to a number of errors.

Fixation of prices of foods and necessities, A. Dulac (*La Formation des Prix des Denrées Alimentaires de Première Nécessité. Paris, 1911, pp. 158*).—Statistical and other data are summarized and discussed.

General and invalid cookery, W. Hotz (*Kochbuch für Gesunde und Kranke. Mellenbach, Switzerland, 1911, pp. VIII+257, pls. 6, figs. 20*).—A vegetarian cookbook, with recipes for milk and egg dishes also.

[Changes in rations, storage of foods, and other food topics], H. G. Sharpe (*Rpt. Commis. Gen. [U. S. Army] 1911, pp. 16*).—Information is given

regarding the work of the Commissary Department with respect to changes in rations, a training school for bakers and cooks, and other topics.

As regards the use of cans of different sorts, it has been found by actual trial "that large losses can be saved to the Government by the use of sanitary enamel-lined cans, and especially for tomatoes intended for shipment to the Philippines."

In connection with a study of fresh beef and mutton in the Philippines information is given regarding the general appearance of the beef frozen for about 3 years and that frozen for a month, and also the results of a cooking test and data regarding the cost of storage. "While the frozen quarter . . . appeared unattractive and lacked the plumpness, freshness, and bright color found in fresh frozen beef, . . . when cooked it had the flavor, tenderness, and as shown by the chemical analysis, the nutritive value of fresh frozen beef."

The tests made with beef stored up to 3 years seem to demonstrate "that there is a variance in the percentage of moisture and fat contained in the various samples. This in no way affects the nutritive value of the beef, as the analyses show that the percentage of protein varies but slightly in the 6 samples tested. . . .

"Beef in good condition stored in dry, well insulated rooms, kept at a low unvarying temperature, will not mold."

Taking into account storage, insurance, and interest, 100 lbs. of beef at 8 cts. a pound, would represent at the end of 1 year's storage a cost of $9.31; at the end of 2 years' storage, $10.71; and at the end of 3 years' storage, $12.21.

During the 3 years beef was held in cold storage "there was a shrinkage of at least 8½ per cent, which gives 91.5 lbs. of beef costing 13.34 cts. per pound, an increase of 5.34 cts. per pound over the original cost."

My system of diet, M. HINDHEDE, trans. by MARIE DIETZ (*Mein Ernährungs System. Berlin and Leipsic, 1911, pp. 196*).—A German translation of the author's elucidation of a system of diet which he proposes, with directions for preparing a large variety of dishes. See also a previous note (E. S. R., 21, p. 167).

Lessons in the proper feeding of the family, WINIFRED S. GIBBS (*New York, 1911, rev. ed., pp. 53*).—This discussion and collection of recipes, like the earlier publication of which it is a revision (E. S. R., 23, p. 568), is designed for housekeepers with varying incomes, from the very poorest to those having as much as $25 per week.

Concerning the food requirements of old men, ELISABETH KOCH (*Skand. Arch. Physiol., 25 (1911), No. 4–5, pp. 315–330*).—The 5 old men studied were from 54 to 79 years of age. On an average the diet supplied 106 gm. protein, 55 gm. fat, 361 gm. carbohydrates, and 34 gm. ash, the total energy value being 2,430 calories per day, or, as shown by the digestion experiments, 91 gm. digestible protein, 51 gm. fat, 337 gm. carbohydrates, the total energy value being 2,235 calories, or 33.8 calories per kilogram of body weight. The nitrogen in the urine was determined and showed in every case except one that there were small nitrogen gains.

The nutrition of public school children (*Schr. Zentralst. Volkswohlfahrt, 1909, No. 4, dgms. 2, pp. 170*).—A conference report, which includes a paper by M. Rubner on the nutrition of school children.

The adaptability of the animal body to an oversufficient diet, E. GRAFE and D. GRAHAM (*Ztschr. Physiol. Chem., 73 (1911), No. 1–2, pp. 1–67, pl. 1; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 587, II, p. 811*).—When dogs were overfed for long periods nitrogen was retained while body weight was fairly constant. Apparently, this was due to great activity, increase of oxidation, and

loss of water. Full details are given of metabolism experiments; the respiratory data indicate luxus consumption.

The influence of preparation of food on its digestibility, F. BEST (*Deut. Arch. Klin. Med., 104 (1911), No. 1–2, pp. 94–118; abs. in Jour. Amer. Med. Assoc., 57 (1911), No. 21, p. 1730*).—The question was studied with dogs having retention cannulas at different points in the small intestines.

The addition of butter to bread and vegetables lengthened the time foods remained in the stomach and upper intestines, and so in the author's opinion increased thoroughness of digestion. Sugar, bread, and potatoes remained only a short time in this part of the digestive tract and made the lowest demands on digestive secretions. Flour gruels, meat, and cream were completely assimilated, no residue reaching the cannulas. Raw fruit was digested to a soft mass before reaching the large intestine. It is the author's opinion that the work of the digestive apparatus is lessened if fruit is cooked soft before it is eaten.

In general, he calls attention to the fact that the appearance and flavor of food stimulates the appetite and the secretory and motor reflexes which aid digestion.

The time different foods remain in the stomach, WULACH (*München. Med. Wchnschr., 58 (1911), No. 44, pp. 2319–2322*).—According to the experimental data reported, carbohydrate mixtures remain in the stomach from 2½ to 3½ hours; proteid mixtures from 5 to 6 hours; and fat from 7 to 8½ hours. Potato and pork fat mixtures remained a longer time in the stomach than potato and cream or potato and butter, indicating differences in the digestibility of different fats. The results are discussed on the basis of invalid dietetics.

The digestibility of white of egg as influenced by the temperature at which it is coagulated, P. FRANK (*Jour. Biol. Chem., 9 (1911), No. 6, pp. 463–470, dgms. 2*).—Some of the conclusions follow which were drawn from the author's experimental study of the artificial digestion of egg white:

"The progress of the hydrochloric-acid action and the total digestion is most rapid in the albumin not heated beyond 75° C.

"If the tubes were heated up to 100° C., then those in which the heating started at 40° show greater hydrochloric-acid action and digestibility than those started at 50° and so on consecutively while the 100° shows the least.

"The rate of digestion seems to progress more evenly with the hydrochloric-acid action in the albumin heated up to 75° C. than it does in the others. . . .

"The progress of the hydrochloric-acid action and the digestion, while proportionately greater the longer the period of digestion, diminishes relatively as digestion continues."

The paper includes a critical discussion of methods.

The digestion of flour, M. KLOTZ (*Jahrb. Kinderheilk., 73 (1911), No. 4; abs. in. Zentbl. Physiol., 25 (1911), No. 8, p. 319*).—The investigations reported have to do with the effect of different kinds of flour on the bacterial content of the feces.

Diet and pellagra—a warning against ill-advised attacks on foodstuffs, G. A. ZELLER (*Jour. Amer. Med. Assoc., 57 (1911), No. 21, pp. 1688–1690*).—The author is of the opinion that the statements which have been made connecting corn and cotton-seed oil with pellagra are not warranted, and that in the light of present knowledge of this disease "it is safe to advise the public to continue to use standard food preparations."

Pellagrous symptoms produced experimentally in fowls by feeding maize spoiled by inoculation with a specific bacterium, C. C. BASS (*Jour. Amer.*

Assoc., 57 (1911), No. 21, pp. 1684, 1685, figs. 2).—A preliminary note on experiments indicating that lesions similar to those of pellagra in man were attributable to feeding corn meal inoculated with cultures of bacteria obtained from the feces of pellagrous patients.

It is stated that the experiments will be continued.

On the relation of the organic phosphorus content of various diets to diseases of nutrition, particularly beriberi, I, G. C. E. Simpson and E. S. Edie (*Ann. Trop. Med. and Par., 5 (1911), No. 2, pp. 313–345*).—An extended digest of data is presented regarding diseases such as beriberi and rickets, attributed to faulty diets and frequently to deficient assimilation of organic phosphorous.

In addition the authors briefly report the results of experiments made with pigeons on rice, barley, and so-called standard (whole wheat) and white bread. Their results confirm the unfavorable influence which other investigators noted "of polished rice, steamed rice, and steamed barley fully, and the protective influence of whole rice, whole barley, rice meal, yeast, and Katjang-idjo." The curative effects of yeast in pigeons severely affected with neuritis were more marked than the authors expected and so much so that they "were astonished at the rapidity and completeness with which the birds recovered."

On an exclusive diet of white flour bread pigeons became ill and died, showing marked degenerative changes in their peripheral nerves. The average duration of life was 29 days and the average loss of weight 26 per cent. On an exclusive diet of whole wheat bread the birds continued active and well, maintained their weight and condition, and on an average gained 8 per cent of their original weight.

The possible bearing of these experiments on rickets in children is discussed.

With reference to the curative effects noted with yeast and other substances the authors hope to present "the results of [their] attempt to isolate the active principle, whether it be one of the organic phosphorus compounds or a substance which associates itself with these in its reactions, as do ferments with nucleoproteids."

The etiology of beriberi with special reference to the theory that it is due to insufficient phosphorus, Y. Teruuchi (*Saikingaku Zasshi, 1910, No. 179, pp. 1–32; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 16–17, pp. 719, 720*).—Rice bran was extracted with dilute hydrochloric acid, the extract made slightly alkaline, the precipitate removed, and the filtrate evaporated to dryness on a water bath and extracted a number of times with warm absolute alcohol. The material obtained after evaporating the alcohol prevented polyneuritis when fed to pigeons in addition to polished rice, and induced recovery when fed to pigeons suffering from this disease. The phosphorous content was very small, representing 1/1,000 part of the phosphorus present in the original bran. The author concludes, therefore, that it is not the phosphorus compound but some other constituent of rice bran which prevents the occurrence of polyneuritis in birds.

Internal secretions—their physiological status and their importance in pathology, A. Biedl (*Innere Sekretion—ihre physiologischen Grundlagen und ihre Bedeutung für die Pathologie. Berlin and Vienna, 1910, pp. XI+538*).—In this handbook and digest of data the author presents a general account of glandular activity, hormones, and theories pertaining to the subject, and discusses glands and their secretions in detail, some of the chief headings being the thyroid, thymus, suprarenal system, internal secretions of the stomach and intestine, and internal secretions of the kidney.

An extended bibliography is an important feature of the work.

Laboratory studies of pepsin, pancreatin, and combinations of these ferments, A. ZIMMERMAN (*Jour. Indus. and Engin. Chem., 3 (1911), No. 10, pp. 750–753*).—The investigations have to do particularly with the influences of pepsin upon pancreatin when these substances are administered together.

Animal heat and bio-energetics, J. LEFÈVRE (*Chaleur Animale et Bio-énergétique. Paris, 1911, pp. XV+1107+32, figs. 211*).—This exhaustive treatise presents a historical and critical account of the development of the subject and an extended discussion of topics concerned with the general question. The main divisions include physiological calorimetry and the heat balance, thermo-regulation and thermo-genesis, general introduction to the study of bio-energetics, and bio-energetics and general physiology. As a whole the volume constitutes an important and exhaustive handbook and treatise.

The numerous references to the investigations cited and the detailed index are important features.

Metabolism of plants and animals, E. ABDERHALDEN (*Internat. Hyg. Ausstellung, Dresden, 1911, Gruppe Ernährung. Stoffwechsel der Pflanze und des Tieres. Berlin, 1911, pp. 24, figs. 16*).—An illustrated description of apparatus exhibited at the International Exposition of Hygiene, Dresden, 1911, and a brief account of the history of this line of investigation.

ANIMAL PRODUCTION.

The influence of maturity upon the value of timothy hay, H. J. WATERS (*Proc. Soc. Prom. Agr. Sci., 31 (1910), pp. 71–98, figs. 8*).—A report of a study of the influence of time of harvest upon the yield, feeding value, keeping quality, convenience of harvesting, selling value, and permanency of stand of timothy hay.

At the Missouri Experiment Station selected areas of pure timothy of uniform development were harvested at 5 stages of growth, and the cured hays carefully weighed and analyzed, the average results being as follows:

Average yield per acre of nutrients in timothy hay.

Stage of cutting.	Stage of development.	Cured hay.	Dry matter.	Protein.	Nitrogen-free extract.	Crude fiber.	Ether extract.	Crude ash.
		Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
First	Coming into blossom.	5,180	3,411	260.9	1,634.5	1,181.0	112.1	221.8
Second	Full bloom	5,433	3,964	292.6	1,952.6	1,337.9	122.9	257.7
Third	Seed formed	5,793	4,089	271.1	1,983.9	1,479.4	111.0	237.9
Fourth	Seed in dough	5,750	4,038	252.8	2,032.9	1,428.9	110.1	212.1
Fifth	Seed ripe	5,193	3,747	218.6	1,876.9	1,342.8	87.2	221.4

There was no consistency in the yield of cured hay from year to year, because of the variable amounts of water. There was but little difference in the yield of dry matter between the second, third, and fourth stages, though the average for 3 years was slightly higher in the third cutting. The decrease in yield of dry matter toward maturity was thought to be due to rain, shedding of the leaves, and transposition of the material to the bulb and seed.

The results of 3 digestion trials with yearlings and 2-year-old steers on a ration consisting entirely of hay, are summarized in the table following.

Digestion coefficients of timothy hay.

Stage of cutting.	Approximate date of harvest.	Dry matter.	Protein.	Nitrogen-free extract.	Crude fiber.	Ether extract.	Ash.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
First	June 12	58.51	51.61	[a]55.02	65.78	38.12	34.76
Second	June 20	54.40	50.20	55.60	58.40	36.00	32.20
Third	July 1	49.86	41.93	52.45	51.49	45.87	29.32
Fourth	July 8	47.39	38.78	48.97	48.98	48.85	31.76
Fifth	July 16	47.37	42.05	47.56	50.87	43.06	28.45

[a] Corrected data supplied by author.

To test the palatability, hay from each cutting was put into separate compartments of a long rack. Steers receiving no other feed preferred the hays in the order in which they were cut. When the steers and also Jersey cows were given supplementary rations they did not show so decided a preference for any one of the early cuttings, but did discriminate against the last 2 cuttings. Fat wethers that were given all the corn they would eat, when turned to a rack containing the 5 cuttings ate one with apparently as much relish as the other. These tests indicate that the earlier cuttings were more palatable and more completely digested.

In the matter of convenience of harvesting, however, the greener the grass when cut the longer the time required to cure it and the more easily it is damaged by showers and dews. In the Mississippi Valley it is more convenient to postpone harvesting timothy because the farmer is busy cultivating corn when the hay harvest is at its best, whereas the farmer of the Atlantic Seaboard, who grows relatively more timothy and less corn, can more readily harvest his timothy earlier without neglecting the corn. Apparently this accounts for the difference in practice between the East and the West in respect to making hay, both practices being considered rational.

Late cutting has a favorable influence upon the permanency of stand, as the bulbs are better supplied with food for the next season's growth than if cut earlier. The author gives an account of how timothy is reproduced by the bulb, and is of the opinion that a permanent meadow of timothy can be maintained indefinitely without re-seeding by having a proper regard for this method of maintaining the stand.

Animal production, A. Köhler and F. Mach (*Jahresber. Agr. Chem., 3. ser., 13 (1910), pp. 340–451*).—This is the usual annual review of literature on analyses of feeding stuffs, nutrition, milk production, and dairy products.

Feeding stuffs, F. Mach (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb., 1910, pp. 17–30*).—Analyses are reported of cotton-seed and peanut-cake meals; coconut, linseed, poppy, palm, sesame, and soy-bean cakes; wheat, barley, speltz, oat, and peanut brans; brewers' grains; distillery slop; molasses and molasses feeds; beet chips; dried beet leaves; barley; oats; maize; meat meal; tomato meal; and mixed feeds.

A sample of tomato meal consisted principally of the seeds and skins of the fruit and gave the following composition: Water 9.5, protein 21.44, fat 19, nitrogen-free extract 17.44, fiber 25.7, and ash 6.92 per cent. The composition of dried beet leaves was as follows: Water 18.57, protein 6.99, fat 0.94, nitrogen-free extract 43.01, sugar 16.89, fiber 9.08, mineral matter 21.41, and sand 7.31 per cent.

Investigations of feeding stuffs, E. Haselhoff (*Jahresber. Landw. Vers. Stat. Harleshausen, 1910–11, pp. 7–11*).—Analyses are reported of cotton-seed,

barley, oat, rice, and soy-bean meals; peanut, sesame, turnip, linseed, palm-nut, and coconut cakes; wheat and rye brans; dried distillery slop; brewers' grains; malt sprouts; molasses feeds; beet chips; maize; beans; fodder beets; apple pomace; meat, fish, and blood meals; cattle salt; and feeding lime.

The valuation of oats for feeding and their judging by chemical and physical analyses, P. BAUER (*Abs. in Chem. Ztg., 34 (1910), No. 128, p. 1144*).—An examination of numerous samples of oats showed the following ranges: Crude fat from 3 to 9 per cent, protein from 8 to 16 per cent, and glumes or hulls from 20 to 35 per cent. The glumes contained from 1.5 to 2 per cent of protein, from 2.2 to 2.4 per cent of ash, and 2 per cent less water than the oat flour. It is stated that cereals with a high protein content are not palatable and have a tendency to produce a pathological condition. Consequently, the author recommends as the best oats for feeding those low in protein, well ripened, and with a high germinating power.

The chemical composition of Hungarian wheat bran, I. WEISER (*Kisérlet. Közlem., 14 (1911), No. 4, pp. 581–588*).—Analyses of bran from 40 varieties of Hungarian wheat gave the following averages: Fine bran, water 13, protein 15.3, fat 4.5, fiber 9.45, nitrogen-free extract 51.77, and ash 5.98 per cent; coarse bran, water 13, protein 15.5, fat 3.6, fiber 8.91, nitrogen-free extract 52.21, and ash 6.78 per cent.

The feeding value of niger cake, HANSEN (*Mitt. Deut. Landw. Gesell., 26 (1911), Nos. 29, pp. 396–399; 30, pp. 412–414; 31, pp. 425, 426*).—An analysis of niger cake, which is the residue after pressing the oil from the seeds of *Guizotia oleifera*, is reported as follows: Dry matter 89.24, crude protein 31, pure protein 30.25, fat 3.15, nitrogen-free extract 29.83, fiber 14.65, and ash 10.61 per cent, of which there is digestible protein 24.8, fat 2.52, and carbohydrates and fiber 27.52 per cent.

The cake was contrasted with sunflower cake in feeding tests with milch cows and fattening wethers. The average yield of milk from 10 cows during the sunflower cake period was 18.51 kg. per head and day, containing 2.78 per cent of fat. In the niger cake period the corresponding figures were 18.23 kg. of milk and 2.7 per cent of fat. The basal ration consisted of fodder beets, clover, oat straw, peanut cake, and palm-nut molasses. In the test with sheep the average daily gain per head and day with the sunflower cake ration was 0.172 kg., and with the niger cake ration 0.174 kg., the basal ration being in this case hay, fodder beets, and palm-nut molasses.

From these tests it would appear that the niger cake is about equal in feeding value to the sunflower cake, although containing somewhat less protein and fat. It is recommended by the author as an economical feed when it costs 10 marks per 100 kg. if fed to cows and sheep at the rate of about ½ kg. per head and day per 100 kg. live weight.

Studies on the domesticated animals of the Mediterranean islands, C. KELLER (*Neue Denkschr. Schweiz. Naturf. Gesell., 46 (1911), pt. 2, pp. 105–187, pls. 8, figs. 20*).—An anatomical study of the domesticated animals on Samos, Crete, Cyclades, Sicily, Sardinia, and Baleares islands, together with a discussion of the origin of the domesticated animals of Europe.

On the races and breeds of cattle, M. NEUMANN (*Studien über die geschichtliche Entwickelung der Einteilung der Rinder in Rassen und Vorschläge zu einer synoptischen Uebersicht der Rinderrassen Europas. Inaug. Diss., Univ. Bern, 1910, pp. 48*).—A new classification of European breeds of cattle is presented, though it is based largely on the classifications of other authors.

Annual report of the general manager of the Naivasha stock farm for the year 1909–10, J. K. HILL (*Dept. Agr. Brit. East Africa Ann. Rpt. 1909–10, pp. 111–116*).—A report of the success attendant upon the importation of Eng-

lish breeds of live stock. Weights of the crosses between native sheep and imported animals are given.

Cutting down the shipper's loss, G. P. McCabe (*Country Gent., 76 (1911), No. 3057, pp. 4, 5, figs. 3*).—An account of the effect of the workings of the Federal cattle transportation law in cutting down the losses formerly caused by inhuman methods of shipping live stock.

The Moravian cattle (*Das mährische Rind. Brünn, 1910, vols. 1, Das Rind der mährischen Sudeten, pp. 73, pls. 14; 2, Das südmährische Fleckvieh, pp. 56, pls. 4, charts 12*).—A general discussion of cattle breeding in Moravia, with descriptions of the different breeds. Photographs and measurements are given of various types. The two volumes were written by A. Ostermayer and M. Nitsche, respectively.

The goats of Nedjed in Arabia, Caucurte (*Chasse et Pêche, 1911, No. 22, p. 498; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, p. 651*).—An account of the goat of Nedjed, Arabia, which closely resembles the Syrian goat but is somewhat smaller. The she-goat is a small milker, and the hair is used for the same purposes as that of the "samar" or Syrian goat

A cage designed for metabolism experiments on goats, A. R. Rose (*Science, n. ser., 34 (1911), No. 868, p. 221*).—A description of a wooden cage, with a heavy wire screen floor, that can be used for metabolism experiments with sheep and goats.

Sheep raising in the French Sudan, G. Regelsperger (*Quinz. Colon., 15 (1911), No. 4, pp. 126–128; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, p. 650*).—An account of the possibilities of the sheep industry and wool trade in West Africa. A sheep station has been established at Goubo, in the Issa-Ber region, as it is thought that Sudan wool can be made remunerative by improving the conditions of production.

Feeding experiments, 1910–11, A. D. Faville (*Wyoming Sta. Bul. 89, pp. 11, fig. 1*).—A continuation of earlier work in testing the feeding value of Wyoming-grown grain for lamb feeding (E. S. R., 23, p. 573).

The present test consisted of feeding 5 lots of lambs, 32 in each lot, for a period of 98 days. The gains per head and day were as follows: On corn and native hay 0.19 lb.; corn and linseed cake 3:1 and native hay 0.27 lb.; and corn and alfalfa meal 3:1 and native hay 0.23 lb. At the close of the test the lambs averaged 100.2 lbs. each in weight, with a shrinkage of 5.8 lb. per lamb in transit from Laramie to Denver.

The native hay consisted principally of tufted hair grass (*Deschampsia cæspitosa*), wire grass (*Juncus balticus*), and slough grass (*Beckmannia crucæformis*). Other species present were Canada bent grass (*Calamagrostis canadensis*), Nebraska sedge (*Carex nebraskensis*), a weed (*Plantago eriopoda*), and long-styled rush (*Juncus longistylis*).

Additional facts in swine feeding, with special reference to developing swine for breeding purposes, W. Dietrich (*Illinois Sta. Circ. 153, pp. 4*).—This circular presents the results of experiments made to ascertain the food requirement of breeding swine as contrasted with those of market swine, previously reported (E. S. R., 22, p. 574).

"The experiments seem to show that pigs which are to be developed for breeding purposes should start with 0.5 lb. of digestible crude protein daily per 100 lbs. live weight when 2 months old. This should be increased to 0.55 lb. during about 7 weeks, then reduced to 0.45 lb. during the next 4 weeks, and then during the following 7 or 8 weeks they should be fed 0.5 lb. of digestible crude protein per 100 lbs. live weight daily. Following this there is an-

other 4 weeks' period of reduction from 0.5 to 0.35 lb., and then another 7 or 8 weeks' period of feeding 0.4 lb. Thus the reduction continues till the hog reaches maturity at 2 years of age, when only about 0.2 lb. of digestible crude protein is necessary as a daily allowance per 100 lbs. live weight. . . .

"Pigs that are to be developed for breeding purposes should have about 13 lbs. of total water daily per 100 lbs. live weight when they are 2 months old. This includes the water contained in the feeds used in the ration, as well as the water that is used as water. This quantity of water is gradually reduced so that when the pig is 8 months old it is getting 9 lbs. of water daily per 100 lbs. live weight. Following this the amount of water in the ration should remain somewhere between 8 and 10 lbs. daily per 100 lbs. live weight. . . .

"The amount of carbohydrate fed to pigs that are being developed for breeding purposes should be somewhat lower than is fed to market pigs, so as to prevent them getting too fat. They should get approximately 2.2 lbs. at the beginning, which should be increased to 2.4 lbs. during the third to the sixth month inclusive. Following this it should be decreased so as to keep the pigs in the desired breeding condition."

The approximate amounts to be given at different ages of a ration consisting of soy beans and skim milk are presented in tabular form.

The new book of the horse, edited by C. RICHARDSON (*London, New York, and Toronto, 1911, vols. 4, pp. XI+316, pls. 17, figs. 138; 2, pp. VII+628, pls. 11, figs. 155*).—This is a profusely illustrated work on the history of breeds and breeding of horses in England. There are also chapters on steeplechasing, hunting, horse breeding and breeds on the continent, American horses, and diseases of horses, written by different authors.

Pure-bred horses in the United States, G. M. ROMMEL (*Jour. U. S. Cavalry Assoc., 22 (1911), No. 87, pp. 422–427*).—This contains statistics of the number of pure bred animals of each breed of horses registered in the United States, June 30, 1910. There are also data on licensed stallions in a number of States where stallion laws have gone into effect.

Horse breeding in Hungary, H. T. ALLEN (*Jour. U. S. Cavalry Assoc., 22 (1911), No. 87, pp. 417–421*).—The advantages of using thoroughbreds to cross with coarser breeds are illustrated in this account of the encouragement of horse breeding given by the Hungarian government.

Origin and type of the Ardennais, J. ASHTON (*Breeder's Gaz., 60 (1911), No. 19, pp. 931, 932, figs. 3*).—A discussion of the characteristics of this French breed of horses.

[Equus hybrids], R. I. POCOCK (*Proc. Zool. Soc. London, 1911, III, Abs. 99, p. 42*).—A note on a hybrid between the Somaliland wild donkey (*Equus asinus somaliensis*) and the mountain zebra (*E. zebra*), which is believed to be the first cross between these 2 species. The period of gestation was 12 months and 3 weeks. The foal showed a greater resemblance to *E. asinus* than to *E. zebra*, the body being entirely unbanded except for the spinal and shoulder stripes. The stripes on the legs extended as high as the abdomen and were broader and more numerous than in the sire and narrower and fewer than in the dam. As regards the shoulder stripe, spinal stripe, and the stripe on the base of the ear the foal resembled typical examples of *E. asinus*, and differed from its actual sire which was without those marks.

Horses v. oxen for field work in Russia, D. V. TEDOROV (*Khoziaĭstvo, 6 (1911), No. 4, pp. 120–123; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 648, 649*).—The cost of keeping a horse in southern Russia is said to be from 35 to 40 kopecks (from 17.5 to 20 cts.) a day and that of an ox from 15 to 18 kopecks. The ox is also less expensive because it can be worked when younger and is less liable to disease.

[Poultry], H. L. A. BLANCHON (*Exploitation productive des Oiseaux de Basse-Cour. Paris, [1911], pp. 292*).—A general treatise on raising, breeding, and feeding fowls, turkeys, pigeons, geese, and ducks.

The baby chick, edited by T. E. QUISENBERRY (*Mo. Poultry Bd. Quart. Bul., 1 (1911), No. 1, pp. 54, figs. 48*).—Methods of incubating and caring for young chicks are discussed by different authors.

The forms and colors of breeds of fowls, R. HOUWINK (*De Hoenderrassen: Overzicht van alle bekende Hoenderrassen in hunne Vormen en Kleuren. Assen, 1909, vols. 1, pp. XIV+272; 2, pp. 273–560, pls. 3, figs. 450*).—A work on fowls from the natural history point of view. There is a classification of all breeds and the origin and history of each breed is traced as far as possible. The first volume contains introductory matter and an account of Dutch breeds, and the second volume treats of the breeds of other countries.

The Orpingtons, edited by J. H. DREVENSTEDT (*Buffalo, N. Y., and Quincy, Ill., 1911, pp. 78, pl. 1, figs. 61*).—An account of the characteristics, standard requirements, and best methods of breeding and mating this breed of fowls. The articles are contributed by different authors.

The Rhode Island Reds, edited by D. E. HALE (*Buffalo, N. Y., and Quincy, Ill., 1911, pp. 86, pl. 1 figs. 76*).—A monograph on the origin, development, and special characteristics of the types of this breed. The articles are contributed by various authors.

Egg-laying competitions, D. S. THOMPSON (*Dept. Agr. N. S. Wales, Farmers' Bul. 48, 1911, pp. 16, figs. 17*).—A summary of records for 9 years of the egg-laying competition at the Hawkesbury Agricultural College and Experiment Farm, Richmond, New South Wales.

The duration of fertility of fowls' eggs after separation from the cock, J. L. FRATEUR (*Rev. Gén. Agron., n. ser., 6 (1911), No. 6–7, pp. 259–261*).—In 2 cases eggs were fertile that were laid 14 days, and in one case 13 days, after the cock had been removed from a pen of laying fowls.

Deterioration in eggs as shown by changes in the moisture content, A. D. GREENLEE (*Science, n. ser., 34 (1911), No. 868, pp. 223, 224*).—In a uniform lot of eggs held at a constant temperature and analyzed at short intervals of time the rate of changes in moisture content was determined and platted. By means of the formula derived therefrom it is thought that the condition of any lot of eggs can be predicted from the first analysis for any given date within the holding period.

The preservation of eggs in the home, J. VANDERLECK (*Amer. Food Jour., 6 (1911), No. 11, pp. 13, 14*).—Eggs were preserved for 8 months by different methods, with the following results: Of those preserved in either water glass, limewater, or varnished with vaselin all were good; of those treated with permanganate of potash or with boric acid and water glass, or packed in wood ashes or in peat dust 20 per cent were bad; of those varnished with either shellac, collodion, or water glass 40 per cent were bad; of those submerged in salicylic acid, treated with alum, or sterilized 12 seconds in boiling water 50 per cent were bad; of those rubbed with salt, packed in brine, covered with paraffin, or varnished with glycerin and salicylic acid 70 per cent were bad; of those wrapped in tissue paper or preserved in salicylic acid and glycerin 80 per cent were bad; and of those preserved in salt water all were unpalatable, as the salt penetrated the eggs.

A new point in artificial incubation (*Illus. Poultry Rec., 3 (1911), No. 4, p. 158*).—This is a note on the experience of P. Sweers, who has found that the greater evaporation of machine-hatched eggs after the machine is used for the first time, as compared with those under hens, is due to changes in the wood,

whereby it becomes more absorbent. This influence can be overcome by covering the wooden parts with oiled cloth.

Report of proceedings of the conference on the poultry industry, Dublin, May, 1911 (*Dept. Agr. and Tech. Instr. Ireland, Conf. Poultry Indus. Proc., 1911, May, pp. VIII+234*).—Besides statistics on poultry and other matters relating to the poultry industry in Ireland this contains the following papers: Education in Poultry Keeping in Ireland, by J. R. Campbell; Promotion of Poultry Keeping, by E. Brown and P. A. Francis; Production of and Trade in Table Poultry, by F. B. Nasmyth-Miller and J. W. Hurst; Transit of Eggs and Live Poultry, by D. S. Prentice; Present Position and Needs of Cooperative Collection and Distribution, by J. N. Harris; The Organization of the Irish Poultry Industry, by R. A. Anderson; Collection and Grading of Eggs, by J. Drysdale and T. S. Porter; and Sale of Eggs, by P. Hickey and L. Wilson.

Plans and descriptions of five-acre poultry farms and the addresses of the lecturers at the State Poultry Institute, edited by T. E. QUISENBERRY (*Mo. Poultry Bd. Quart. Bul., 1 (1911), No. 2, pp. 133, figs. 67*).—This treats of different phases of the poultry industry. The articles are contributed by several authors.

Studies on the early development of the hen's egg.—I, History of the early cleavage and of the accessory cleavage, J. T. PATTERSON (*Jour. Morph., 21 (1910), No. 1, pp. 101–134, figs. 32*).—Ovulation is thought to be directly caused by the activity of the infundibulum. As in the case of the pigeon, fertilization took place immediately after ovulation, when the egg was in the region of the infundibulum. Only 5 or 6 supernumerary sperm nuclei entered into the egg except in one case. Upon their entrance into the egg each migrated toward the periphery of the disc, some of them passing down to the deeper portions to undergo a complete fragmentation, while others reached the margin, giving rise to a rudimentary accessory cleavage, which disappeared shortly after the 8-celled stage, or between 4 and 5 hours after fertilization.

The period of development from the first cleavage until the 346-celled stage was reached was estimated to be about 8 hours. Under normal conditions it takes about 22 hours for the egg to traverse the entire length of the oviduct. The time occupied in the different portions was as follows: Glandular portion 3 hours, isthmus 2 to 3 hours, uterus and laying 16 to 17 hours. It was found possible to lengthen the time beyond 22 hours by disturbing the hen when about to lay. On one occasion it was delayed for 20 hours, and when it was finally deposited and examined this was found to be equal to about 20 hours of incubation.

Details of segmentation are given in full and compared with those of the pigeon. Hens which laid daily laid about an hour later each succeeding day, though some hens laid so irregularly that the time could not be predicted. Few hens laid before 8 a. m. or after 4 p. m.

Experiments on developing chicken's eggs, S. PATON (*Jour. Expt. Zool., 11 (1911), No. 4, pp. 469–472*).—The technic employed in detaching a fertilized hen's egg from the shell, so that the successive changes in the developing embryo could be watched, is described. There is also a brief notice of the action of several fluids upon the embryo.

The rôle of salts in the preservation of life, J. LOEB (*Science, n. ser., 34 (1911), No. 881, pp. 653–665*).—It is pointed out that the rôle of salts in the animal body is less known than that of protein, fat, and carbohydrates. Though salts can not furnish energy by oxidation, yet they seem to be a necessary part of the diet. Experiments made with tissues of vertebrates, eggs of inverte-

brates, and unicellular plants and animals indicate that the function of salts is to render the surface film of the cells of the body less permeable to liquids that otherwise might interfere with the normal processes within the cells. The dynamic effect of salts is not discussed.

Atmospheric variation as a factor in organic evolution, D. TRAILL (*So. African Jour. Sci., 7 (1911), No. 7, pp. 290–305*).—The author's argument is that since the first organisms appeared on earth there has been a steady withdrawal of carbon from the atmosphere, and though heat, cold, drought, famine, and other factors have been at work they are in the nature of oscillations. Atmospheric variation is considered to be the dominant factor in organic evolution, and it is predicted that at a date not far distant all life on this planet must come to an end because of carbon hunger, unless there is some new source of carbon.

The first principles of heredity, S. HERBERT (*London, 1910, pp. 199; abs. in Lancet [London], 1910, II, No. 4553, p. 1618*).—A work which presents in a popular form the problems connected with reproduction, inheritance of acquired characters, and the inheritance of diseases.

Investigation on inheritance, W. JOHANNSEN (*Fortschr. Naturw. Forsch., 3 (1911), pp. 71–136, figs. 27*).—A general summary of work during the past 30 years, with special reference to Mendelian inheritance and the genotype theory.

The distribution of pure line means, J. A. HARRIS (*Amer. Nat., 45 (1911), No. 539, pp. 686–700*).—Rœmer's recent work with peas is analyzed to show that a series of averages which can be arranged in a symmetrical variation polygon does not necessarily prove the existence of differentiated pure lines.

Notes on two crosses between different races of pigeons, T. H. MORGAN (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 21 (1911), No. 4, pp. 215–221, figs. 6*).—In a cross between a white fantail and a "swallow" pigeon the F_2 generation was intermediate in the number of tail feathers, feathers on legs, and color. The crest was dominant. Segregation was practically complete for the feathers on the legs. The most interesting result of a cross between the turbit and the starling was the failure of the reversed feathers on the breast to reappear in the second generation.

On color and color-pattern inheritance in pigeons, J. L. BONHOTE and F. W. SMALLEY (*Proc. Zool. Soc. London, 1911, III, pp. 601–619, pls. 4*).—Though the results reported in this paper are to a large extent confirmatory of Mendelian inheritance, it is stated that there are some problems which that hypothesis fails to meet, such as the differences of shades in the same color, the predominance of one sex in certain colors, the gradual increase of the white in grizzles and mealies in successive generations, and the apparently large predominance of homozygous chequers and heterozygous grizzles.

The Mendelian conclusions reached are summed up as follows: Silver is dilute blue; blue is dominant to silver; chequering is dominant to its absence (i. e., a self-color); grizzling is dominant to its absence (i. e., a self-color); grizzling is dominant to chequering, though the impure dominants may sometimes be easily distinguished; a mealy is a grizzled bird with the white wholly or partially replaced by red; red in a mealy is apparently dominant to white, and hence a mealy is dominant to a grizzle; white and grizzling when they have met combine together and have a common inheritance; red combines with grizzling in the same way as does white.

For a better understanding of terms used to denote the colors of pigeons, chequering, grizzling, mealy, blue, silver, and red are defined.

Prehistoric cattle skulls in the museum at Schwerin, and their significance to the history of cattle breeding in Mecklenburg, W. ZENGEL (*Die prähistorischen Rinderschädel im Museum zu Schwerin und deren Bedeutung für die Geschichte der mecklenburgischen Rindviehzucht. Inaug. Diss., Univ. Bern, 1910, pp. 20; Arch. Anthropol., n. ser., 9 (1910), No. 3–4, pp. 159–178*).—This contains descriptions and measurements of skulls, which are identified as *Bos primigenius* and *B. brachyceros* with the exception of 2 intermediate types which the author thinks are the result of a cross of primigenius and brachyceros. A comparison with other specimens leads to the conclusion that Mecklenburg cattle, like other lowland breeds, had their origin in the old red cattle.

A bibliography is appended.

DAIRY FARMING—DAIRYING.

Four systems of dairy farming and the profit on each, W. J. FRASER and R. E. BRAND (*Illinois Sta. Circ. 151, pp. 24*).—This circular explains and compares 4 different systems of cropping for a 160-acre dairy farm, showing the differences due to kinds of crops and their adaptability to the feeding of dairy cows.

The results are shown in the following table:

Estimation of comparative results of different systems of dairy farming.

Rotation.	Estimated of digestible nutrients per acre.	Estimated number of cows per farm.	Estimated milk per acre.	Estimated profit per farm.	Estimated gain or loss in nitrogen per farm.
			Pounds.		*Pounds.*
Corn, oats, corn, oats, timothy, pasture, pasture, pasture	245,182	38	991	$2.43	−1,900
Corn, corn, corn, oats, clover, clover and timothy, pasture, pasture	322,359	51	1,475	780.00	+ 110
Corn, corn, corn, oats, clover, pasture, pasture, alfalfa	379,126	65	2,025	1,947.00	+2,280
Corn, alfalfa	617,730	100	3,150	3,928.00	+5,830

Dairy farm management in the Ozarks, L. A. ALLEN (*Missouri Bd. Agr. Mo. Bul., 9 (1911), No. 6, pp. 29, figs. 11*).—A bulletin written for the practical dairy farmer in southwestern Missouri.

Feeding dairy cows, C. C. HAYDEN (*Illinois Sta. Circ. 152, pp. 31*).—This circular discusses in a popular way the composition and digestibility of both homegrown and purchased feeds, the effects of different feeds on the animal, the summer soiling system, and gives directions for balancing rations. A number of sample rations for dairy cows are suggested.

Comparative feeding experiments with milch cows in relation to the effect of rice feed meal, sesame cake, and dried brewers' grains, V. RENNER (*Fühling's Landw. Ztg., 60 (1911), No. 15, pp. 515–538*).—The author reports experiments in which a ration containing dried brewers' grains gave a larger yield of milk and a higher percentage of fat than rations containing sesame cake and rice feed meal.

The effect of a change of feed on the composition of cow's milk, with special reference to the nitrogen content, P. H. VIETH (*Der Gehalt der Kuhmilch besonders an den verschiedenen Arten der stickstoffhaltigen Substanz bei wechselnder Ernährung. Inaug. Diss., Univ. Leipsic, 1909; abs. in Milchw. Zentbl., 6 (1910), No. 9, pp. 428, 429*).—An addition of peanut meal to the

normal ration of milch cows increased the quantity of milk and the percentage of all solids except ash and sugar in varying amounts, according to the individuality of the animal. The effect was more noticeable in the early part of the lactation period. The content of albumin was increased more than that of casein.

The factors concerned in milk secretion (*Jour. Amer. Med. Assoc., 57 (1911), No. 21, pp. 1699, 1700*).—An editorial which reviews recent investigations on galactagogues, most of which have been previously noted from other sources.

Machine v. hand milking, J. G. McMillan (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 859–868*).—A report of milking machine trials at the Hawkesbury Agricultural College, where they have been used for nearly 9 years.

From this work it is concluded that the flow of milk is not appreciably decreased when machine milking is substituted for hand milking, except in isolated cases, and that the period of lactation is not shortened or subsequent periods of lactation adversely affected in any way. Cows that had been milked by machine continuously for 5 years apparently did not decrease in the annual yield of milk. The percentage of solids in the milk remained the same as with hand milking, and the cows were no more subject to udder troubles. Machine milking was much the cheaper and cleaner when the machines were properly cared for and run by a capable operator.

The cost of milk production, J. H. Monrad (*N. Y. Produce Rev. and Amer. Cream., 33 (1911), No. 1, pp. 46, 48, 50*).—This consists of various estimates made during a period of 25 years in Europe and America.

The determination of the number of bacteria in milk by direct microscopical examination, R. S. Breed (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 16–18, pp. 337–340, fig. 1; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 5, p. 710*).—The method described gives a much higher count than plating, and is thought to give a more truthful idea of the real number present.

Milk standards: A study of the bacterial count and the dairy score card in city milk inspection, W. K. Brainerd and W. L. Mallory (*Virginia Sta. Bul. 194, pp. 3–20, figs. 3*).—The average of 185 counts of samples of milk taken from the milk supply of Richmond, Va., between August 1 and October 15, was 33,000 per cubic centimeter. During the same period the average score of the 54 dairies under observation was 81. The samples of milk were taken at the stables. About 70 per cent of the counts was below the average count, the latter being raised abnormally by a comparatively few very large counts. One count of nearly 2,000,000 occurred in a dairy in which the count never at any other time exceeded 14,000, which would indicate that in some cases there was carelessness on the part of the men rather than any fixed condition which prevailed. This was further illustrated by a comparison of the counts of the different dairies with the score. As a rule the count varied with the score, but for some unknown reason the highest scoring dairy showed a larger bacterial count than the lowest scoring dairy.

The authors state that the score card has a value as an educator, is now the most potent influence in raising the quality of the milk supply, and its use should be continued until some better method can be developed. It is defective because it will not effectively guard against disease germs, such as typhoid bacteria. The bacterial count as a measure of sanitary properties of milk is defective because it is cumbersome, and a high count is not always evidence of a dangerous milk. It is, however, very useful in connection with the score card.

To show the relation between the amount of dirt in milk and the bacterial content, varying quantities of dirt were added to the milk. With each increase

in the quantity of dirt there was an increase in the number of bacteria, but the increase was not proportionate to the amount of dirt added.

The dairy score card used in this work is given.

Usefulness and limitations of so-called milk standards, L. L. VAN SLYKE (*Horn and Hoof, 4 (1911), No. 4, pp. 8–10*).—A discussion of chemical and biological standards for commercial milk.

Improvement of the milk supply, I. C. WELD (*Ohio State Univ. Bul., 14 (1910), No. 7, pp. 71–79*).—A lecture given at the dairy institute at Toledo in February, 1909, in which are discussed the results of scoring dairy farms and inspection of city milk supply.

Tuberculosis and the milk supply, S. DELÉPINE (*Jour. Meat and Milk Hyg., 1 (1911), No. 10, pp. 543–574*).—A general summary of measures, public and private, which can be put into practice to diminish the danger of infecting human beings with tuberculosis by means of the milk supply.

A bibliography is appended.

[Report of the joint committee on] pasteurization, E. D. SHURTLEFF ET AL. (*Rpt. Joint Com. Tuberculin Test [Ill.], 1911, pp. 73–79*).—A summary of the advantages and disadvantages of pasteurizing. The conclusions concerning the tuberculin test are noted on page 283 from another source.

Formulas for standardizing milk, cream, or ice cream, F. E. PECK (*Hoard's Dairyman, 42 (1911), No. 43, p. 1317*).—These formulas are simple and have an advantage over the diagram method in that the desired result can be obtained in one operation.

Production of milk and butter in winter, H. MARTEL (*Hyg. Viande et Lait, 5 (1911), No. 10, pp. 561–578*).—This contains some statistics on the amounts and value of milk and milk products in European countries, and a discussion of the importance of having more cows freshen in the autumn so as to furnish a more even supply of milk and butter throughout the year.

Milk and its products in the Caucasus, C. ERIZIAN (*Milch Ztg., 40 (1911), Nos. 39, pp. 385–387; 40, pp. 395–398*).—This discusses the general conditions of the dairy industry in this region, and describes the types of butter, cheese, and other products prepared for market.

On the Siebenbürg Racka sheep, with special reference to the milk, F. BAINTNER (*Kisérlet. Közlem., 14 (1911), No. 4, pp. 597–614*).—An account of this breed of sheep, with analytical data on milk and milk products.

Butter from ewe's milk, A. DALL'AGLIO (*Caseificio Mod., 4 (1911), No. 4, pp. 54–95; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 652, 653*).—A report of experiments in making whey butter from ewe's milk. From 108 liters of whey 12.5 liters of cream was obtained, from which was produced 4.35 kg. of butter.

The butter industry in France and in foreign countries, A. ROLET (*L'industrie du beurre en France et a l'Etranger. Paris [1910], vols. 1, pp. 270; 2, pp. 186, figs. 35; abs. in Indus. Lait [Paris], 36 (1911), No. 15, p. 257*).—A general treatise on the art and science of butter making. The first volume treats of the methods and extent of the butter industry in France, and the second of the manufacture and commercial importance of butter making in other countries.

Factory managers' butter exhibition, M. A. O'CALLAGHAN (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 853–858, pls. 2*).—The percentages of moisture, curd, boric acid, and the content of different species of bacteria in butter are reported.

Gastro-intestinal trouble accompanied by vomiting, caused by eating butter, O. FETTICK (*Ztschr. Fleisch u. Milchhyg., 22 (1911), No. 2, pp. 51–56*).—A sample of butter which had caused intestinal trouble was found to be rancid,

abnormal in color, and high in acidity. It was also found to be contaminated with a great variety of organisms, including yeasts, molds, and coli and aerogenes types of bacteria. The percentage of lactic-acid bacteria colonies was unusually low. Apparently the butter had been made without the customary regard for cleanliness and had not been thoroughly worked in order to remove the buttermilk.

How can we approximate the fat content of cheese products from the results of an analysis and the method utilized for producing the cheese? HÖFT (*Milch Ztg., 40 (1911), No. 25, pp. 248, 249*).—For determining the ultimate fat and total solid content of a cheese, the result of the specific gravity determination of the original milk is taken as a basis. The density figures are then compared with a table which foretells the total solid content of the cheese. Another procedure consists of determining the difference between the density of the original milk and that of the resulting whey.

All the figures in the tables are based on the premises that under the same conditions the same amount of fat-free dry substance of the milk used goes over into the cheese. The author points out as a result of his work that this is not always the case, because the method of working up the cheese is also a factor.

The Raffiné cheese of the Island of Orleans, J. C. CHAPAIS (*Le Fromage Raffiné de L'Isle d'Orléans. Quebec: Govt., 1911, pp. 30, figs. 8*).—A description is given of the method of making this whole milk soft cheese, manufactured on the Island of Orleans, Province of Quebec. An analysis is reported as follows: Water 53.82 per cent, fat 25.35 per cent, and solids-not-fat 20.83 per cent.

Extraction of lactose from milk serum, R. SANFELICI (*Indus. Latt. e Zootec., 9 (1911), No. 6, pp. 88, 89; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 654, 655*).—Lactose paste, an intermediary product from which milk sugar was obtained on evaporating whey after the manufacture of Ricotta cheese, gave the following analysis: Water 24.58, fat 1.26, protein 5.22, lactose 58, ash 5.86, and undetermined substances 0.9 per cent. From 100 kg. of this paste from 44 to 45 kg. of raw sugar was obtained. The concentration of the whey cost 0.8 franc per hectoliter and the total cost of extracting 100 kg. of refined lactose would be about 25 francs ($2.09 per 100 lbs.).

Casein, O. WENNEVOLD (*Mælkeritid., 23 (1910), No. 36, pp. 785–794*).—A description of the methods of manufacture and general requirements for the success of the industry.

VETERINARY MEDICINE.

Veterinary bacteriology, R. E. BUCHANAN (*Philadelphia and London, 1911, pp. 516, figs. 214*).—This book represents a revision of the lectures given to the students in the division of veterinary medicine of the Iowa State College during the past 6 years, and "constitutes a serious attempt to put in usable form that fund of knowledge concerning bacteriology which the students of veterinary medicine should master."

The book is divided into 6 sections, as follows: (1) Morphology, physiology, and classification of bacteria; (2) laboratory methods and technique; (3) bacteria and the resistance of the animal body to disease; (4) pathogenic microorganisms exclusive of the protozoa; (5) pathogenic protozoa; and (6) infectious diseases in which the specific cause is not certainly known.

Pathological technique, F. B. MALLORY and J. H. WRIGHT (*Philadelphia and London, 1911, 5. ed., rev. and enl., pp. 507, pls. 2, figs. 144*).—This is the fifth revised and enlarged edition of this work, which is a practical manual for

workers in pathology, histology, and bacteriology, and includes directions for performing autopsies and clinical diagnosis by laboratory methods.

The physiology of parturition, R. F. Bourne (*Amer. Jour. Vet. Med., 6 (1911), No. 9, pp. 726–729*).—This paper discusses our present knowledge of the subject and its relation to obstetrics.

Obstetrical aid for large calves in the normal posterior sacral position, W. Becker (*Über die Geburtshilfliche Entwickelung zu Grosser Kälber in der normalen Hinterendlage. Inaug. Diss., Univ. Bern, 1909, pp. 24, figs. 4*).—A description of methods of obstetrical aid for large calves in the normal posterior sacral position with and without embryotomy.

The chemistry of synthetic drugs, P. May (*London, New York, and Calcutta, 1911, pp. XIII+229*).—This book contains a description of the chemical nature of synthetic drugs, with particular reference to their pharmacology.

Use of chloral hydrate in fistula, R. F. Stirling (*Vet. Jour., 67 (1911), No. 430, pp. 227, 228*).—Cotton plugs saturated with a 10 per cent solution of chloral hydrate were found to yield remarkable results for fistulous withers which before had failed to respond to treatment.

The source of the immune bodies in the lymphs, F. C. Becht and A. B. Luckhardt (*Amer. Jour. Physiol., 27 (1911), No. 4, pp. XI, XII*).—The authors studied "the problem of the passage of the antibodies from the blood to the lymphs and other body fluids," with the result that they "find that the antibodies—hemolysins, agglutinins, and opsonins—pass at about the same rate from the blood into the lymphs, but they make their appearance in a shorter time in the thoracic than in the cervical lymph. They are nearly always in higher concentration in the former than in the latter, although the reverse may be true occasionally after the experiment has been in progress for several hours. The antibodies hardly pass into the cerebrospinal fluid at all. The same is true of the aqueous humor. The concentration of the antibodies in the various body fluids in the animal rendered passively immune by this method soon reaches an equilibrium, which is the same as that in the actively immunized animal of the same degree of immunity. From [their] experiments [the authors] concluded that the source of the antibodies of the lymphs is the blood, and that the antibodies obey the laws of lymph formation as do the other constituents of the lymphs."

The part played by the spleen in the formation of immune bodies, A. B. Luckhardt and F. C. Becht (*Amer. Jour. Physiol., 27 (1911), No. 4, pp. XVI, XVII*).—As a working hypothesis the authors assumed that an animal with a spleen would produce antibodies more rapidly than a splenectomized animal.

As a result of this work they conclude that "the animals possessed of a spleen produced the specific antibodies (hemolysins, hemagglutinins, and hemopsonins) more rapidly. The ultimate concentration of these antibodies in the serum was usually much higher than in the splenectomized animal; never was the concentration lower. In this relation of immunity there seems to be no compensation for the spleen, at least within a period of 8 months. Intraperitoneal introduction of spleen emulsion from dogs immunized 3 to 24 hours previously by an intravenous injection of antigen (goat or rat blood) resulted in the appearance of the specific antibodies in the serum of the recipients. No increase in antibodies was noted in the sera of those animals into whose peritoneal cavity normal spleen emulsion was introduced. The introduction of 'immune' heart muscle, liver, bone marrow, and lymph glands did not give positive results. The method of transplantation of the spleen in toto has so far not proved feasible in our hands."

On the alterations in hemolytic immune-body which occur during the process of immunization, C. H. Browning and G. H. Wilson (*Jour. Hyg.*

[*Cambridge*], *11* (*1911*), *No. 2, pp. 208–219*).—As the estimation of the amount of immune-body necessary to produce lysis at different periods does not give any information as regards qualitative changes undergone by the molecules of the immune-body during the course of immunization, the authors to investigate the subject have chosen an immune-body obtained by injecting washed ox-blood corpuscles into the peritoneal cavity of rabbits.

As a result of the work they found that "the hemolytic immune-body which is developed shows qualitative differences at different stages of immunization. The immune-body molecules which appear in the serum in the early stage of immunization (e. g., 4 to 8 days after a single injection of 2 to 4 cc. of red blood corpuscles) are deficient in the power of causing absorption of complement when added to the corresponding blood corpuscles. This is most clearly brought out by the very slight increase in complement absorbed under the influence of multiple doses of immune-body as compared with the amount absorbed by 1 dose. The deficient complement absorption does not depend to any marked degree on deficient combination of immune-body with the receptors of the red corpuscles. When, after repeated injections of blood corpuscles, immunization has been carried to such a stage that an immune-body is produced which is very active in causing absorption of complement, then it is found that on ceasing to give further injections the relative complement-combining power remains high after the immune-body content of the serum as measured by the hemolytic dose has fallen to a very considerable extent. So far as [the authors] are aware the occurrence of such alterations in the properties of immune-body during the process of immunization has not hitherto been noted."

In regard to the action of exudate leucocytes on antibody formation, O. Stenström (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8* (*1911*), *No. 4, pp. 483–497*).—It appears from this work that the presence of polymorphonuclear leucocytes at the site of inoculation somewhat prevents the formation of agglutinins and possibly of bacteriolysins. Precipitin formation was not reduced, but on the contrary seemed to be increased. The white blood cells, therefore, can not be considered factors in these processes.

Histological-chemical detection of peroxidase, R. Fischel (*Wiener Klin. Wchnschr., 23* (*1910*), *No. 44, pp. 1557, 1558; abs. in Chem. Zentbl., 1910, II, No. 25, p. 1837; Analyst, 36* (*1911*), *No. 419, p. 75*).—If pus or bone marrow (myelocytes) is dried upon a glass slide and treated with a 2 per cent solution of sodium benzidinemonosulphonate solution (containing 0.01 cc. of a 0.3 per cent solution of hydrogen peroxid) a blue coloration is obtained, the leucocytes being colored blue. Red blood corpuscles also give the same reaction, but 0.5 cc. of hydrogen peroxid is necessary. As leucocytes give no reaction when heated to a temperature of 100° C., the method may serve as a distinguishing test between leucocytes and erythrocytes.

The biological detection of latent pus accumulations, E. Tedeschi (*Ann. Ist. Maragliano, 3* (*1910*), *pp. 1–8; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2* (*1910*), *No. 12, p. 247*).—A simple precipitation method is described for detecting latent pus accumulations in the body. The reaction is based on the premises that the resorption products from pus accumulations are capable of producing antibodies in the blood stream.

The poisonous effects of the black bean (Castanospermum australe) on cattle, S. T. D. Symons (*Agr. Gaz. N. S. Wales, 22* (*1911*), *No. 3, pp. 196–198, fig. 1*).—Deaths among cattle in the North Coast district of New South Wales have been frequently reported as the result of eating the beans of *C. australe* (black bean tree, or Moreton Bay chestnut). The bean on ingestion causes an intense gastrointestinal irritation which results in a severe diarrhea and which

is supposed to be due to the saponin which the bean contains. The symptoms and post-mortem findings with some of the animals so poisoned are given in detail.

The development of ascarids, P. Rózsa (*Allatorvosi Lapok, 33 (1910), No. 46, p. 543; abs. in Vet. Rec., 23 (1911), No. 1194, pp. 742, 743*).—The author reports a case of intestinal impaction in a calf of 3 weeks that was caused by *Ascaris vituli*. Supposing it to be a case of constipation, a dose of 10 gm. of aloes and 100 gm. of magnesium sulphate was administered. The following day a mass of more than 200 reddish-white ascarids of from 10 to 12 in. in length was passed. It is thought by the author that the calf had become infested in the first days of its life, most probably by taking ova with developed embryos, from the teats, and that their development had taken place in the short period intervening.

The action of extracts from Ascaris equorum on the coagulation of the blood of rabbits, E. Emile-Weil and G. Boyé (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 29, pp. 284, 285*).—The authors have found that an extract of *A. equorum* has a retardative influence on the coagulation of rabbit blood and suggests that this may partially explain the hemorrhages caused by these parasites.

The epizootiology of anthrax, S. Stockman (*Jour. Campar. Path. and Ther., 24 (1911), No. 2, pp. 97–108, table 1; Vet. Rec., 24 (1911), No. 1206, pp. 122–127*).—A discussion in regard to the diagnostic methods, epizootiology, and preventive measures for anthrax. The statistics of Great Britain for the years 1906–10 are used as a basis for the article.

Unusual case of anthrax in a mare, J. H. Carter (*Vet. Rec., 24 (1911), No. 1199, pp. 2, 3*).—A detailed description of the case.

A case of anthrax treated by Sclavo's serum, W. M. Fergusson (*Brit. Med. Jour., 1911, No. 2637, pp. 103, 104, chart 1*).—A case of anthrax which had its origin in a heifer was successfully treated by this serum.

In regard to a bacillus simulating the glanders bacillus, Martini (*Abs. in München. Med. Wchnschr., 58 (1911), No. 17, p. 914*).—This rod bacterium was isolated from a case which was diagnosed as glanders in man. It was found on examination to produce alkalinity in litmus milk. The glanders bacillus produces acidity.

The precipitation reaction of Konew, W. L. Boyd (*Amer. Jour. Vet. Med., 6 (1911), No. 9, pp. 723–725; Amer. Vet. Rev., 39 (1911), No. 5, pp. 568–571*).—The Konew test (E. S. R., 24, p. 184) was found to yield positive results with 6 cases of glanders. Four of the cases which were also tested against the mallein test and 2 against the agglutination test gave positive results.

An examination was made of the serum from other animals affected with fistulous withers, poll evil, cartilaginous quittor, and exuberant granulations following wire cuts, as well as of the serum from normal horses, but in no instance was a positive reaction obtained.

Report of the committee on standard methods for the bacterial diagnosis of glanders, W. L. Beebe et al. (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 7, pp. 493–501*).—After making a statistical study of the results obtained by the various methods thus far proposed for diagnosing glanders, the committee of the American Public Health Association concludes that "mallein is the most reliable practical method that we have of diagnosing glanders; the agglutination test is a very valuable aid in diagnosing glanders, and, in some cases, can be employed where conditions prevent the application of other tests; Straus' method is reliable in clinical cases where a positive reaction is obtained in the pig and *Bacterium mallei* recovered in pure cultures from the

lesions; it is advisable to make cultures in suitable culture media, such as glycerin potato, from the suspected material when Straus' method is employed; complement fixation is very reliable, but is probably too tedious and complicated for routine procedure; cuti-reaction and ophthalmo reactions with mallein have shown very poor results."

[An atypical case of rabies], N. Foss (*Vet. Rec., 24 (1911), No. 1206, pp. 120, 121*).—A description of a case in a 12-year-old pointer dog.

The simplest method for staining the Negri bodies, M. STUTZER (*Ztschr. Hyg. u. Infektionskrank., 69 (1911), No. 1, pp. 25–28, fig. 1*).—The author has modified Nicolle's method for detecting the Negri bodies as follows:

The paraffin section is carried through xylol, alcohol, and water in the usual manner, placed for from 5 to 15 minutes in Löffler's methylene blue solution (which has been previously diluted with distilled water to make a transparent solution), and differentiated with a 1 per cent solution of tannic acid. The length of time for exposure to the solution depends upon the thicknesses of the sections being stained. The progress of differentiation is observed by means of the low power of the microscope until the nuclei of the nerve cells show up plainly.

When the differentiation is completed the preparation is taken from the tannin solution and dried with filter paper, quickly carried through alcohol and xylol, and mounted in Canada balsam. The Negri bodies appear reddish violet, while the nerve cells are blue.

Pyocyaneus infection in dogs and its similarity to rabies, W. F. HARVEY, R. M. CARTER, and H. W. ACTON (*Vet. Rec., 24 (1911), No. 1202, pp. 57–59*).—In this paper the results of examining 5 cases in dogs are reported, which in one way or another would lead one to suspect rabies. In all instances *Bacillus pyocyaneus* was detected and could be recovered from guinea pigs and rabbits which were inoculated with the brain substance and the blood. Negri bodies were not noted.

A paratyphoid-like bacillus isolated from a dog, E. H. RUEDIGER (*Jour. Infect. Diseases, 8 (1911), No. 4, pp. 486–499*).—During a routine test for Negri bodies in a dog the author came upon a case which was negative as regards Negri bodies, but from the blood of the heart and the pus from the lung a small rod-like bacterium was isolated which resembled the paratyphoid bacillus morphologically and biologically. It was found to be highly pathogenic for guinea pigs, rabbits, and monkeys, and had a tendency to produce pneumonia. A soluble toxin, according to the author, is probably not produced by this organism.

While comparing this organism with strains of paratyphoid A and B the author incidentally noted that practically no difference exists between the bacilli usually classified as A and B.

Susceptibility of certain domestic animals to plague infection with particular reference to that of ground squirrel origin, G. W. MCCOY and C. W. CHAPIN (*Jour. Infect. Diseases, 9 (1911), No. 3, pp. 276–281*).—"Although there are a few discordant reports, the general experience with animals other than rodents and anthropoids seems to be that local and temporary constitutional effects are observed in a considerable number of cases after feeding or after subcutaneous inoculation with cultures of *Bacillus pestis* or with plague tissues, but that fatal infections are extremely rare. The cat is an exception to this rule, and exhibits a considerable degree of susceptibility. The results of our experiments have been quite in harmony with the above generalization. *B. pestis* was demonstrated at the site of inoculation after several days in the case of the calf, hog, and sheep, but not in the case of the goat. Adequate

doses of the serum of the goat and the calf inoculated with a culture of *B. pestis* certainly protected rats against plague infection. In the case of the hog and the sheep some protection was probably exerted."

Biology and morphology of Streptothrix maduræ, J. Koch and Stutzer (*Ztschr. Hyg. u. Infektionskrank., 69 (1911), No. 1, pp. 17–24, figs. 2*).—The causative agent of Madura foot or Mycetoma pedis was studied biologically and with the following results: (1) For the strain of Streptothrix examined the optimum temperature for growth was found to be from 16 to 22° C. (2) Among the fluid media bouillon containing blood serum and peptone was found to be the best. (3) Coagulated, defibrinated horse blood, horse blood agar, and alkaline agar were found to be the best solid media for the development of this organism. (4) During the growth of this organism a peptonizing ferment was produced which acts upon casein, gelatin, and coagulated horse serum.

Serum diagnosis in trichinosis, H. Ströbel (*München. Med. Wchnschr., 58 (1911), No. 13, pp. 672–674*).—The results show that it is possible in some cases at least to detect trichinosis with the complement fixation method.

Comparative investigations in regard to the tubercle bacilli of man and domestic animals, Zwick (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 4 (1908), Nos. 3–4, pp. 161–166, pl. 1; 5–6, pp. 321, 322, table 1; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 31, pp. 555, 556*).—On the basis of his investigations with human and bovine tubercle bacilli the author considers the division of these 2 types of bacteria into separate classes as proper. In regular cases of bovine tuberculosis only the bovine type of bacillus was present. Two cases of tuberculosis in children, which were supposed to have their source in milk from a tuberculous cow, are cited. From both of the children the human type of tubercle bacillus was isolated, and this, according to the author, excludes the assumption that the infection came from the cow.

The precipitin reaction of Bouome for detecting tuberculosis and differentiating between the bovine and human form of the disease was not found to be of any value.

The second part of the work deals with the examination of tubercle bacilli obtained from the goat, pig, horse, and dog. In 4 cases of tuberculosis in the hog and in 3 of the goat the bacilli found were of the bovine type. In one case of tuberculosis in a horse the bacillus of the avian type was isolated.

Examination of the tubercle bacilli obtained from bovines, E. Rothhaar (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 5 (1908), No. 1–2, pp. 101–128; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 31, p. 556*).—The tubercle bacilli from 27 cases of naturally infected bovines were examined as regards the characteristics set up by Kossel, Weber, and Heuss for the bovine type of bacillus and a close agreement found. No transition forms or organisms of a diminished virulence were noted.

The occurrence of tubercle bacilli in the milk and lymphatic glands of bovines, H. J. Smit (*Über das Vorkommen von Tuberkelbacillen in der Milch und den Lymphdrüsen des Rindes. Inaug. Diss., Univ. Bern, 1908, pp 36, figs. 7*).—The results of this investigation show that the milk from cows affected with chronic tuberculosis, but possessing sound udders, rarely or very seldom contains tubercle bacilli. Where, however, open tuberculosis exists in such animals tubercle bacilli can gain entrance into the milk from all channels which communicate with the exterior.

The findings with the mammary glands, etc., from tuberculous cattle on autopsy are given in detail.

The presence of tubercle bacilli in the circulating blood, T. Kurashige (*Ztschr. Tuberkulose, 17 (1911), No. 4, pp. 347–365; abs. in München. Med.*

Wchnschr., 58 (1911), No. 26, p. 1411).—Tubercle bacilli were found present in the blood in all of the 3 stages of this disease in man. Schnitter's method was used for detecting the bacilli.

In regard to the nature of the caseous degeneration process of avian tubercle bacilli, P. CHAUSSÉ (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 34, pp. 459, 461; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 15–16, pp. 403, 404*).—The author has previously expressed the opinion that the caseous degeneration in bovine tuberculosis is due to a granular fatty degeneration of the cells. In this paper he points out that the process is identically the same as in avian tuberculosis.

Brain tuberculosis, O. E. VOGEL (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 30, pp. 536, 537*).—A description of a case of brain tuberculosis in an ox which came to autopsy. The symptoms are described in detail.

A case of equine tuberculosis, B. DEVINE (*Vet. Rec., 24 (1911), No. 1139, pp. 1, 2, pl. 1, charts 2*).—A description of a case of tuberculosis in a brown cart gelding. The symptoms and pathological findings are described in detail.

Statistics of tuberculin tests and post-mortem findings, J. F. DEVINE (*Amer. Vet. Rev., 39 (1911), No. 4, pp. 431, 432*).—The tests and data herein discussed were made by different investigators under ordinary varying conditions and were prepared for the purpose of determining whether any distinct relation existed between the temperature noted and the post-mortem findings.

"Comparison of the temperatures of generalized and localized cases tends to show that the temperature readings are no positive indication as to the extent of the disease in the animal, other than that in about 75 per cent of the generalized cases the temperature readings were from 105 to 106° as against 72 per cent of the localized cases giving the same temperature readings, but it should again be noted that the percentage of localized cases was more than twice as many as the generalized cases of the total number tested and condemned. The number of no lesions, viz, about 3½ per cent, seems to be quite in keeping with statistics furnished by others. The author would add, however, that post-mortem inspection was carried on only to the extent of ordinary meat inspection and in no instance were minute or microscopical examinations made."

Abolition of tuberculin test for imported cattle, A. M. THACKARA (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 217, pp. 1251, 1252*).—The new quarantine regulations in Germany which went into effect July 1, 1911, governing the inspection of cattle coming in from Norway, Sweden, and Denmark, do not include the tuberculin test. All cattle are to be given a clinical examination by veterinarians, and when necessary, by bacteriological tests.

The reasons assigned are that the tuberculin test is unreliable, that it often causes harm to the cattle, and furthermore, that it hampers the trade in imported cattle. On the other hand, the agricultural interests claim that the abolition of the tuberculin test will greatly weaken the protection against infectious diseases, because they believe that the test is the best method of preventing the importation of tuberculous cattle. According to a statement made by one of the veterinary journals, "the annual statistics of the seaport cattle quarantine stations indicate that of the living animals tested with tuberculin there was scarcely 1 per cent reported as being tuberculous, whereas the statistics of the abattoirs where the imported animals were slaughtered show that more than 30 per cent had been infected with the disease."

Joint committee of House and Senate [of Illinois] to investigate the tuberculin test and the pasteurization of milk and its products, under House Joint Resolution Number 20 (*46. Gen. Assembly Ill., [1910], pp. 471*).—This publication contains the testimony given by lay and expert witnesses at the hearings of this commission held at various places in the United States,

together with a summary of the more important literature bearing on the relation of bovine tuberculosis to the infection in man.

Joint committee of House and Senate to investigate the tuberculin test and the pasteurization of milk and its products, under House Joint Resolution Number 20 (*47. Gen. Assembly Ill.*, [*1911*], *pp. 79*).—This is the second report of this committee in continuance of the investigations noted in the first report (E. S. R., 24, p. 682) and above.

The precipitin, complement-binding, and antiopsonic tests in tuberculous and normal cattle, A. E. Porter (*Jour. Hyg.* [*Cambridge*], *11* (*1911*), *No. 1, pp. 105–117*).—"Advanced tuberculous bovine serum, like human, does not respond very well to the precipitin test. On the other hand, a certain percentage of animals without any macroscopic evidence of tubercle do react. On this account the reaction, although undoubtedly valuable as a prophylactic, does not afford very reliable information as to the condition of an animal about to be slaughtered for meat. Combined with the complement-binding test, which appears to be more characteristic of advanced than of early diseases (the precipitin reaction belonging rather to the early and intermediate stages), it should prove of considerable value. It is interesting that bovine tuberculous serum does not precipitate with 0.5 per cent phenol, in the same way as human tuberculous serum.

"The antiopsonic reaction can hardly be said to be characteristic of tuberculous disease. It represents apparently a flaw in the normal protective mechanism, and if especially present in advanced tuberculous sera is probably only so because the individuals possessing this pre-antiopsonin were rendered thereby more susceptible to the progress of the disease.

"If the precipitin reaction is on the whole perhaps prognostically more favorable, the antiopsonic reaction is probably prognostically unfavorable."

Two chemical reactions for diagnosing tuberculosis, J. Jefimov (*Vrachebnaya Gaz.* [*St. Petersb.*], *17* (*1910*), *No. 51, pp. 1602, 1603; abs. in München. Med. Wchnschr., 58* (*1911*), *No. 17, p. 919*).—In the first reaction some freshly voided urine is heated to the boiling point and its reaction determined with litmus paper. In active tuberculosis the reaction is amphoteric and only in the last stages is it acid.

The second test is conducted as follows: To a small amount of freshly voided urine a small amount of 20 per cent solution of lead acetate is added, then filtered through a double filter, the filtrate brought to the boiling point, and to the hot urine is added dropwise a 10 to 20 per cent alcoholic solution of chemically pure silver nitrate. After 5, 10, and 12 or more drops of the latter are added the urine assumes a brick-red color when tuberculosis is in the latent and secondary stage. It sometimes takes on a violet coloration. In the third stage of tuberculosis the urine yields a dark cherry red coloration.

The ophthalmo reaction v. subcutaneous tuberculin test and the conjunctival test for detecting tuberculosis with tuberculins of various kinds, J. Matschke (*Die Ophthalmoreaktion zur Erkennung der Tuberkulose bei Rindern im Vergleich mit der subkutanen Tuberkulinreaktion und der Konjunktivalprobe mit Tuberkulinpräparaten verschiedener Herstellung und Zusammensetzung. Inaug. Diss., Univ. Bern, 1910, pp. 52; rev. in Ztschr. Tuberkulose, 17* (*1911*), *No. 3, pp. 300, 301*).—The results show that the conjunctival test increases in sensitiveness in proportion to the kind and strength of the preparation employed. In this connection the author points out the value of preparing a polyvalent tuberculin for this purpose. When weak, doubtful, and very doubtful reactions are obtained, repeated installations of the tuberculin will always bring out a more pronounced reaction, providing of course that tuberculosis is present.

The conjunctival test (ophthalmo reaction) under certain conditions is of value for forensic work, and a subcutaneous injection of tuberculin will not influence the test. The ophthalmo reaction only appears when tuberculosis is present and is considered cheaper, takes less time, and is more reliable than the subcutaneous test. A previous conjunctival test will not influence the results of the superseding ophthalmo test.

In regard to Calmette's cobra venom activation method for diagnosing tuberculosis, P. BERMBACH (*Ztschr. Tuberkulose, 17 (1911), No. 4, pp. 334–339*).—According to Calmette, certain sera after inactivation can stimulate cobra venom to hemolyze washed red blood corpuscles which had been previously freed from serum. This venom activating substance is bound to lecithin.

The sera from 19 cases of tuberculosis of man were examined in regard to hemolysis—only 4 showed complete hemolysis. Among the 15 negative cases 5 were positively tuberculous in character, 7 nontuberculous, and 3 doubtful cases.

The ether-antiformin method for tubercle bacilli, KOSLOW (*Berlin. Klin. Wchnschr., 47 (1910), No. 25, pp. 1181, 1182; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 10, p. 527*).—This is a combination of the ether and anitformin method, and has the advantage of being rapid and not requiring the use of the centrifuge.

Immunizing against tuberculosis, VON BAUMGARTEN, DIBBELT, and DOLD (*Arb. Path. Anat. u. Bakt., Path. Anat. Inst. Tübingen, 7 (1910), p. 397; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 15–16, pp. 492, 493*).—In previous work the authors vaccinated animals with the human type of bacillus and were able in this way to produce an immunity which lasted over a period of several years.

The experiments here reported were conducted with 10 calves with a view of determining the minimal dose of the vaccine. The results show that 20 mg. of vaccine was sufficient for all practical purposes to produce a high degree of immunity, and 10 mg. in some cases was just as efficient.

The distribution and longevity of the life of the tubercle bacillus was also observed with 10 adult bovines. In these tests each animal was given from 2 to 5 gm. of the vaccine subcutaneously, and all animals were slaughtered after a period of from 3½ to 4 months. Pieces of the various organs, glands, and muscles of the animals were injected into guinea pigs with the result that only 2 of them died, and these where the pieces of the breast glands on the side in which the injection was made were given. They contained tubercle bacilli.

Results with endotin (tuberculinum purum), B. H. VOS (*Ztschr. Tuberkulose, 17 (1911), No. 4, pp. 340–346*).—In the years 1909–10 36 cases of tuberculosis in man were treated with this preparation, which is said not to produce the undesirable symptoms which result from the injection of old tuberculin. None of the advantages claimed for the preparation over old tuberculin could be noted.

Foot-and-mouth disease 100 years ago, H. KOHL (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 30, pp. 538, 539*).—A historical discussion in regard to the views of veterinarians with reference to this disease 100 years ago.

An unusual complication of mastitis necrotica, R. REINHARDT and O. HOFHERR (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 30, pp. 533–536, figs. 4*).—An unusual case of mastitis in a cow is described which was complicated by the presence of a croupous diphtheritic inflammation of the mucous mem-

brane in the upper air passages, and which was studded with numerous necrotic areas. The mucosa of the first 3 sections of the stomach was also affected.

The author believes that this is a case of metastatic infection caused by a bacterium simulating *B. coli.*

A contribution to the biology of the streptococcus of colpitis granulosa infectiosa, J. HAŠAK (*Tierärztl. Zentbl., 34 (1911), Nos. 1, pp. 2–5; 2; 3, pp. 39–41; abs. in Berlin, Tierärztl. Wchnschr., 22 (1911), No. 17, p. 310*).—This is a short streptococcus which can be cultivated along with the other organisms occurring in the vaginal secretion of diseased bovines. Several strains of the organism isolated were found to differ among themselves, and furthermore, their hemolytic power was found to be very variable. The serum from rabbits which were immunized with this organism was found not only to agglutinate the particular strain employed, but others also in great dilution. Placing the organism in the vagina of healthy animals produced the disease in from 8 to 10 days.

The treatment of contagious vaginal catarrh in bovines, VON VELASCO (*München. Tierärztl. Wchnschr., 55 (1911), No. 29, pp. 486, 487*).—Good results were obtained with 160 bovines by utilizing a mixture composed of copper sulphate, alum, and potassium permanganate (quantities not stated), of which a teaspoonful is dissolved in 1 liter of water, and 120 cc. injected with a syringe into the vagina once daily for 3 weeks.

Steers are treated in the same manner per urethra.

An effective method for combating infectious vaginal catarrh of bovines, MENGERSHAUSEN (*Deut. Landw. Tierzucht, 15 (1911), No. 27, pp. 324, 325*).—The method consists of utilizing tampons saturated with a 3 per cent solution of lysoform.

Parturient paresis (parturient apoplexy or milk fever), R. EBBITT (*Amer. Vet. Rev., 39 (1911), No. 5, pp. 563, 564*).—After giving in a general way a retrospect in regard to this condition the author describes the usual method of treating it without drugs "by inflation of the udder with air and allowing it to remain at least 20 hours before milking out," as he applies it. Where constipation accompanies the condition it is relieved by giving an injection of tepid water.

Traumatic lesions of the udder and tristreaming (*Abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 49, p. 976*).—A collection of studies of cases in animals in which the udder delivered 2 and 3 streams (divided milk streams) points to the fact that in from 5 to 30 per cent of the cases in which the condition was due to yellow galt the udder became useless.

The vaccination campaign against hemoglobinuria in bovines, P. KNUTH (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 17, pp. 306, 307*).—If trypanosomes do not occur in the blood of bovines after vaccinating with supposedly virulent blood it may be due to one of 3 reasons, as follows: (1) The blood employed for vaccination may have contained no trypanosomes at the outset; (2) the trypanosomes may have been present originally, but were destroyed before the blood was used for vaccination; or (3) the animals vaccinated may have been immune as a result of a previous natural infection.

The detection of trypanosomes in the blood after vaccination is best done, according to the author, by the Ross-Koch method. When the examination can not be conducted at once, a small quantity of blood can be taken from the jugular vein in a sterile flask containing some glass pearls and strongly shaken for 10 minutes to defibrinate the blood. It is then transported to the laboratory for later examination.

The treatment of pyometritis in the cow, R. MESSERLI (*Schweiz. Arch. Tierheilk., 25 (1910), No. 5, pp. 350–354; abs. in Vet. Rec., 24 (1911), No. 1204, p. 87*).—A discussion in regard to the symptoms and to a new form of treatment.

Pneumonia in cattle, S. H. GALLIER (*Amer. Vet. Rev., 39 (1911), No. 5, pp. 565, 566*).—After discussing the causes, course, symptoms, and post-mortem findings of this condition the following form of treatment is recommended:

"First place the animal in a well-ventilated warm stall and cover with blanket. To 1 qt. of warm water add 2 lbs. of magnesium sulphate and 1 oz. of turpentine and give in form of drench, and if bowels do not move freely repeat in 12 hours. Also give every hour 1 dram of nux vomica, 10 minims of digitalis fluid extract, and 10 minims of aconite fluid extract. Until fever is reduced feed lightly of bran, oats, and alfalfa hay."

Contagious pleuro-pneumonia (Longziekte) of bovines, L. DE BLIECK (*Meded. Dept. Landb. [Dutch East Indies], 1911, No. 1, pp. 8*).—This is a report in regard to the occurrence of this disease in Java.

Report on the recent outbreak of rinderpest in the District of Davao, Mindanao, C. G. THOMSON (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 5, pp. 243–247*).—The way in which an outbreak, covering an area of 150 square miles, was dealt with is described.

Warbles, S. STOCKMAN (*Bd. Agr. and Fisheries [London], [Vet. Dept.], Ann. Rpts. Proc. 1910, pp. 21–23; Jour. Meat and Milk Hyg., 1 (1911), No. 10, pp. 592–594*).—Tumors on the skin with gradually expanding orifices were marked and carefully watched but in no case was a warble known to make its exit during the night. The author found, however, that exposure to the sun's rays favored the exit from beneath the skin. In observations of 2 infested cattle, commenced in April, 1910, the first warble made its exit on May 31 and others continued to come out until June 12. The average period required for the metamorphosis of these warbles, which were later identified as *Hypoderma bovis*, was 33.6 days, the longest 44 days, and the shortest 23 days.

Bacillus paratyphosus B, B. suipestifer, and B. enteritidis (Gärtner) in comparison with the organisms causing white scours in calves, R. LANGKAU (*Bacillus paratyphosus B, Bacillus suipestifer und Bacillus enteritidis Gärtner im Vergleich zu den Erregern der Kälberruhr. Inaug. Diss., Univ. Leipzig, 1909, pp. 63; abs. in Bul. Inst. Pasteur, 9 (1911), No. 6, p. 261*).—About 10 per cent of the bacteria isolated during enzootics of calf dysentery could not be morphologically and culturally distinguished (on differential diagnostic media for the coli typhoid group) from the paratyphoid group of bacteria. Fermentation tests conducted with xylose, rhamnose, and arabinose showed that qualitative and quantitative differences exist between the paratyphoid and calf dysentery bacteria. The calf dysentery paratyphoid bacterium and the paracoli bacillus (Jensen) are agglutinated alike with Gärtner's serum, and, according to the author, they must both be considered as Gärtner's calf dysentery bacteria. On the other hand, Gärtner's calf dysentery bacteria differentiate themselves from the Gärtner bacterium of human origin in that they do not possess the capacity of being agglutinated (group agglutination) by paratyphoid B and typhoid sera. All of the Gärtner calf dysentery strains are characterized by strong pathogenicity and great toxin formation. Infection tests conducted by the author with calf dysentery bacilli (Gärtner), paratyphoid B, and the so-called hog-cholera bacillus with young stock (half-grown bovines) showed that these bacteria were not wholly without effect.

On the life cycle of Dicrocœlium lanceatum (Distomum lanceolatum), B. ZARNIK (*Sitzber. Phys. Med. Gesell. Würzburg, 1910, No. 2, pp. 27–31, fig. 1;*

abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 3, pp. 361, 362).—The author describes the cercariæ of this trematode which he found in the liver of a badly infested sheep.

Swamp fever in horses, L. Van Es, E. D. Harris, and A. F. Schalk (*North Dakota Sta. Bul. 94, pp. 257–353, pls. 20, figs. 5*).—The authors summarize and discuss available data and report the results of their own investigations, presenting the following conclusions:

Swamp fever is an infectious disease, transmissible by subcutaneous and intravenous injection and by ingestion. "The virus producing the disease is contained in the blood and urine of affected animals, but it is absent from the feces. The virus has thus far been demonstrated only in an ultra-microscopic form. The virus is resistant to the severe freezing weather of our more northern climates. While not denying the possible transmission of the disease to healthy animals by means of insects and parasites, animals contract the disease naturally by the ingestion of food and water, contaminated by the virus of an infected horse.

"The disease is essentially a septicemia, anatomically marked by subserous and subendocardial hemorrhages in the more acute forms, by occasional involvement of the lymphnodes and spleen, by degenerative changes in the parenchyma of heart, liver, and kidneys, and probably also by certain alterations in the bone marrow of the long bones of the limbs. The chief and most constant manifestations of the disease are fever and albuminuria. The former is remittent or intermittent, not uncommonly at more or less regular intervals, while the latter is transitory and frequently synchronous with the febrile exacerbations. Many cases of swamp fever terminate fatally without a marked reduction in the red blood cells, a fact denying the popular conception of swamp fever being primarily an anemia. The blood of an animal may remain virulent for as long as 35 months after the initial infection, without the infected horse manifesting any clinical evidence of the fact. Such nonclinical infection carriers probably play an important part in the establishment of more or less permanent centers of infection.

"Both trypanblue and atoxyl are worthless in the treatment of the disease. In the light of our present knowledge we have to depend upon such prophylactic measures as the destruction of diseased animals, segregation of suspects, care in introducing new horses into the stable, the safeguarding of food and water supply from urine contamination, pasture drainage, and stable disinfection."

A bibliographical list of 83 titles is appended.

On a blood filaria in the horse, H. Mandel (*Centbl. Bakt. [etc.], 1. Abt., Orig., 57 (1910), No. 1, pp. 84–87, pl. 1, fig. 1*).—The author describes a microfilaria that was found in abundance in the blood of a Berlin horse.

Investigations in regard to pyometritis in the horse, Schuh (*Monatsch. Prakt. Tierheilk., 21 (1910), No. 7–8, pp. 289–321, figs. 7; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 15, pp. 264, 265*).—Pyometritis in the horse is considered by this author a purulent catarrhal inflammation with streptococci as the predominating organisms.

The following anatomical types were recognized: (1) Uterine catarrh with the loss of the mucosa and presence of retention cysts in the glands (Endometritis catarrhalis chronica purulenta atrophicans cystica); (2) uterine catarrh with thickening of the mucosa and proliferation of the glandular tissue (Endometritis chronica purulenta hyperplastica glandularis); (3) uterine catarrh with certain defects in the mucosa (Endometritis chronica purulenta erosiva ulcerosa); and (4) uterine catarrh with the formation of granular and scar tissue (Endometritis chronica purulenta interstitialis).

Salvarsan for the treatment of the pectoral form of equine influenza, KIRSTEN (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 17, pp. 301–305*).—A description is given of some very virulent cases of contagious pleuro-pneumonia which occurred among the horses in a German cavalry regiment and for which dioxydiamidoarsenobenzol (Salvarsan or 606) was tried as a therapeutic agent. This was in some instances given in doses of 4 gm., but in the majority of cases from 2 to 2.5 gm. for every 400 to 450 kg. of live weight were given.

All animals treated with this agent made a comparatively rapid recovery. The greatest disturbing factor was found to be the pain and restlessness caused by the administration of the drug. Only 2 animals out of 7 were lost.

The possibility of the disease being due to a protozoan is discussed.

In regard to lymphangitis in the horse, G. FINZI (*Rev. Gén. Méd. Vét., 18 (1911), No. 206, pp. 71–84, dgms. 2*).—After describing the symptoms and post-mortem findings with horses affected with a special form of lymphangitis, the author gives the results of a study of the causative organism.

The organism was found to be a nonsporulating cocco-strepto-bacillus from 2 to 5 μ long which takes all basic anilin stains, but not Gram, and grows aerobically and anaerobically in bouillon and on agar. It renders media acid, does not coagulate milk, and can not be grown on potato or gelatin. The rabbit, guinea pig, pigeon, and dog are very receptive to the organism, while bovines are only slightly so.

Operation for congenital cataract in a foal, O. JORDAL (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 17, p. 307*).—A one-year-old foal which was born blind was successfully operated upon for cataract in both eyes. The technique used in the operation is described.

Mortality among pigs, W. J. YOUNG (*Vet. Rec., 24 (1911), No. 1206, pp. 117, 118*).—During the last 9 months 100 dead pigs of all ages and sizes came to autopsy at Sheffield, England, with the following findings: Tuberculosis in 22, pneumonia 16, enteritis 7, swine erysipelas 6, swine fever 5, suffocation 5, ascites 4, pulmonary congestion 3, cirrhosis of liver 3, verminous bronchitis 3, internal hemorrhage 3, pericarditis 3, rickets 3, strangulated hernia 2, anthrax 2, pleurisy 2, gastritis 2, endocarditis 1, bacterial necrosis 1, metritis 1, epilepsy 1, peritonitis 1, hydrothorax 1, broken back 1, constipation 1, and liver disease 1.

Tuberculosis when found was generally in the advanced stages. It is pointed out that veterinary aid is seldom sought by farmers for hog ailments, as they depend chiefly upon such remedies as comfrey, Spanish juice, antimony, black sulphur, sirup of poppies, chamomile tea, castor oil, and proprietary pills.

[Report of] departmental committee on swine fever (*Jour. Compar. Path. and Ther., 24 (1911), No. 2, pp. 169–172*).—This committee, which was appointed by the Board of Agriculture and Fisheries of Great Britain in April, 1910, to inquire into the cause of the continued prevalence of swine fever in Great Britain and the possibility of speedily exterminating the disease, reported the following conclusion:

"Restriction on movement, including movement from markets, must continue to form an essential part of any measures adopted to extirpate swine fever. The policy of 'slaughtering out' in the case of all outbreaks now in force in Scotland and Wales should be applied to the country generally as soon as practicable. The present scale of compensation should be maintained. In the general interest of the industry the size of infected areas should be kept as small as possible, due regard being had to the object in view. In view of the evidence as to the conditions prevailing in Ireland, we are of opinion that no useful comparison can be made between the administrative methods of Great Britain and Ireland. The same conclusion applies to continental countries."

The committee recommends studying the following points: "To what extent it is possible for contagion to spread by infective excretions being carried mechanically by attendants and animals other than swine; whether external parasites, such as certain lice, carry the disease from sick to healthy swine; whether pigs which have, to all appearances, recovered from swine fever remain long infective to other swine; whether apparently healthy pigs which have been exposed to infection are capable of transmitting the disease as carriers; for what period it would be safe to consider swine, which have recovered from swine fever, to be immune against a further attack; what use, if any, could be made of artificial methods of immunization to expedite the eradication of swine fever; whether any of the methods, which have lately come into use in connection with other diseases, could be employed in the diagnosis of nontypical cases of swine fever."

Combating hog cholera and swine plague, with particular reference to protective vaccination, F. HUTYRA (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 1, pp. 1–14*).—Previously noted from another source (E. S. R., 24, p. 284).

Immunizing against hog cholera, F. HUTYRA (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 17, pp. 305, 306*).—Commenting on Uhlenhuth's criticism,[a] the author reports experiments made with 64 hogs from 5 to 6 months old with an average weight of 23 kg.

Thirty-two of the animals were divided into 4 groups of 8 each. Each of the groups received an injection of immune serum (a different serum being used for each group) and 2 cc. of hog-cholera virus. Only one of these animals died after a period of 3 months.

The remaining 32 animals were kept as controls and were treated as follows: Eight received 2 cc. of virus; 8 more received 8 cc. of normal hog serum and 2 cc. of virus; another group of 8 were exposed to natural infection and received 2 cc. of virus; while the remaining 8 were not treated at all. The first and second group after 3 months showed a death rate of 75 per cent, the third one of 87.5 per cent, and the fourth one of 50 per cent, giving an average death rate of 71.9 per cent for all the control animals as against 3.1 per cent for all the artificially immunized animals.

Avoiding hog cholera (*Breeder's Gaz., 60 (1911), No. 15, p. 696b*).—It is stated that "several isolated outbreaks of cholera in both eastern and western Canada the past season have been traced by the authorities to the feeding of city hotel garbage, which was found to contain raw pork trimmings and spoiled sausage. Most of the outbreaks developing in sections far removed from previously existing disease districts were traced to the feeding of such refuse of miscellaneous origin."

The prevention of hog cholera (*California Sta. Circ. 68, pp. 8*).—This is a discussion of the steps to be taken in dealing with hog cholera, especially as related to prevention through the use of anti-hog-cholera serum and by inoculation. The loss of hogs in California from this disease is said to have been extensive, having occurred in nearly every hog-raising district of the State. The text of a recent State law appropriating $16,000 for the preparation and distribution of serum vaccine is given.

A method for determining the germicidal value and penetrating power of liquid disinfectants, A. I. KENDALL and M. R. EDWARDS (*Jour. Infect. Diseases, 8 (1911), No. 2, pp. 250–257*).—"The procedure finally adopted was as follows:

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[a] Berlin. Tierärztl. Wchnschr., 27 (1911), No. 13, pp. 220–223.

"(1) Prepare a 24-hour culture of *Bacillus coli* in plain broth of standard composition and reaction; (2) add 10 cc. of this standard culture to 1 liter of agar [1.5 per cent agar] and mix thoroughly; (3) pour the infected agar into sterile tubes of convenient length [1 meter] and of exactly 1.5 cm. diameter and allow to harden, after closing the ends with sterile rubber stoppers; (4) allow to harden at 20° C.; (5) prepare dilutions of the desired disinfectants and a standard 5 per cent carbolic acid solution—the latter is the standard to which the other disinfectants are referred; (6) place the disinfectants so prepared in sterile beakers, allowing 50 cc. for each agar cylinder; (7) remove stoppers from the infected agar tubes, and permit the contents to run out slowly as a long cylinder; with a sterile knife cut off portions by transverse cuts of 2 cm. length, and allow these smaller cylinders to fall directly into the disinfectant solutions, 1 cylinder for each time interval selected; (8) note the temperature of the solutions (they should be kept at exactly 20° C. during the experiment); (9) note the time at which the cylinders were dropped into the disinfectant solutions; (10) at the end of stated intervals (usually at hourly intervals for preliminary tests) remove 1 cylinder from each solution with one of the sterile holders mentioned above, wash it thoroughly with sterile water, and remove a core from the center with a sterile piece of quill tubing (3 mm. bore); (11) place these cores in lactose fermentation tubes, after they are properly labeled, and incubate at 37° C. for several days, making daily observations; (12) compare the killing times of the various solutions tested with that obtained for carbolic acid, and determine the carbolic coefficient of germicidal and penetrating powers combined."

In tests with some common disinfectants and a 72-hour incubation, there was no growth after 1 hour's exposure to 4 per cent formalin; no growth after 3 hours' exposure to 1 per cent formalin, or 1 per cent corrosive sublimate solution; and no growth after 5 hours' exposure to 5 per cent carbolic acid, 0.25 per cent formalin, and 10 per cent chlorid of lime. Even after 5 hours' exposure, however, there was growth with 1 per cent carbolic acid, 0.1 per cent corrosive sublimate, 4 per cent chlorid of lime, 2 per cent hyco, 1 per cent cresol, and 2 per cent sulphonaphthol.

RURAL ECONOMICS.

Farmers of forty centuries, F. H. KING (*Madison, Wis., 1911, pp. IX+441, figs. 248*).—This book is a historical presentation and discussion of the agricultural practices and customs of China, Korea, and Japan as seen by the author in a personal study and survey of the 3 countries. It shows their methods of intensive agriculture and utilization of waste; the area, yield, and cost of the leading crops; modes of travel and transportation; and the customs, manners, etc., of the people.

Agricultural competition between the West and East in the United States of America, K. STEINBRÜCK (*Kühn Arch., 1 (1911), No. 1, pp. 183–223, pl. 1*).—In this article are presented notes and statistics as to agricultural competition between the Eastern and Western States in this country, giving general agricultural statistics for the 2 sections; the causes of the western movement; and data as to the comparative profitableness of farming in the East and West and their future prospects.

Massachusetts: Her agricultural resources, advantages, and opportunities, with a list of farms for sale, J. L. ELLSWORTH (*Boston, 1911, 2. ed., pp. 169, pls. 9*).—This pamphlet was prepared by the Massachusetts State Board of Agriculture, and presents a list of farms for sale in Massachusetts, giving the

size, location, and price of each with a description of its improvements, equipment, etc.

Rural settlement, J. B. TRIVETT (*Off. Yearbook N. S. Wales, 1909–10, pp. 487–506*).—This chapter presents data relative to alienation, size of holdings, etc., of crown lands in New South Wales for a period of years. Excluding from consideration land held simply under lease of the Crown, it is shown that there were in the State at the end of March, 1880, 39,918 alienated holdings averaging 569 acres each, and at the end of March, 1910, 85,178 holdings averaging 602 acres each. Tables are given showing the number, size, etc., of holdings for each division of the State for a period of years, together with other tables showing the nature and extent of the various rural pursuits and the number of persons engaged in each.

[Land tenure and settlement], G. H. KNIBBS (*Off. Yearbook Aust., 4 (1901–1910), pp. 294–309*).—The report here points out that in all the States of Australia acts have been passed authorizing the government to repurchase alienated lands for the purpose of cutting them up into farms or blocks of suitable size and throwing them open to settlement on easy terms and conditions.

The total area acquired up to June 30, 1910, amounted to 2,107,886 acres, the purchase price being £6,904,300. The farms allotted, excluding Western Australia, numbered 6,205 with a total area of 1,858,563 acres.

Tables are given showing particulars of labor settlements, settlement lands, allotments, prices of alienation, etc.

Land tenure, G. H. KNIBBS (*Off. Yearbook Aust., 4 (1901–1910), pp. 1111, 1112*).—In this article it is explained how a settler may obtain a leasehold of the best class of agricultural land in Papua for any period up to 99 years.

Cooperation among farmers: Ethical principles involved, E. M. TOUSLEY (*Grain Growers' Guide, 4 (1911), No. 20, pp. 7, 18, fig. 1*).—An address delivered before the thirty-seventh annual meeting of the New Jersey State Board of Agriculture, Trenton, N. J., January 19–21, 1910, in which the author discusses the ethical principles involved in cooperation, showing that confidence, loyalty, unselfishness, self-control, and mutual helpfulness are the basic principles upon which successful cooperation must rest.

Government loans to farmers, G. H. KNIBBS (*Off. Yearbook Aust., 4 (1901–1910), pp. 430–438*).—Notes and statistics are here presented showing that all the Australian States have established systems under which financial aid is rendered to farmers by the government for the purpose of purchasing or paying off incumbrances on land, making improvements, or developing the resources of the land or building homes thereon. The table below, compiled from figures furnished by the Government Savings Bank of Victoria, gives particulars of loans throughout the Commonwealth made to farmers from 1908 to 1910, inclusive:

Amount, balance due, and profits made on government loans to farmers in Australia, 1908 to 1910.

Year.	Total Advances.	Balance due.	Annual profits.	Accumulated profits.
1908	£5,173,911	£2,987,255	£16,511	£119,146
1909	6,133,165	3,525,416	23,382	144,451
1910	7,058,387	3,913,454	24,700	165,219
Total	18,365,463	10,426,125	64,593	428,816

The crisis of agricultural labor, E. THÉRY (*Écon. Européen, 40 (1911), No. 1038, pp. 679–682*).—Referring to a report submitted to the Chamber of Deputies by the minister of agriculture, the author of this article comments upon its findings as to the crisis confronting agricultural labor in France. It is shown that owners of farms are finding it more difficult from year to year to secure farm laborers, and that they are now paying increased wages and securing less efficient workmen than formerly. The two causes assigned for the difficulty are (1) the decrease in birth rate, and (2) the exodus of laborers from rural districts to towns and cities. The underlying reasons for this condition are noted and discussed together with a number of proposed remedies, prominent among which is agricultural education, and especially domestic science, home economics, etc., for the women.

Creation of small holdings for agricultural laborers in Denmark, R. RAEDER (*Jour. Bd. Agr. [London], 18 (1911), No. 7, pp. 563–566*).—It is here pointed out that in Denmark the law provides for loans from the public treasury to agricultural laborers for the establishment of small holdings exclusively for agricultural purposes.

The size of the holding must not be less than 1 hectare, and the loan can not exceed £440. It is secured by a mortgage on the land, buildings, and live stock, and the rate of interest is 3 per cent. For these loans a sum of £222,400 is provided annually. From 1900 to 1910, 5,092 small farms were established at a cost of £232 per farm. It is significantly stated that the State as creditor has entered into possession of only a very small number of these farms, and that their establishment seems to be an efficacious means of obtaining laborers on the farm, as the movement from country to town has diminished in recent years.

Irrigation in the arid States (*U. S. Dept. Com. and Labor, Bur. Census [Press Bul.], 1911, Dec. 5, folio*).—This preliminary statement by the Bureau of the Census shows in the following table the number of farms and land area of the arid and semiarid region, the value of the farm lands, and the acreage irrigated in the United States in 1909 and 1899:

Irrigation statistics of the arid and semiarid region.

	1909.	1899.	Increase.	
			Number and amount.	Per cent.
Number of farms in arid and semiarid region	[a]1,439,023	[b]1,095,675	343,348	31.3
Approximate land area of arid and semiarid region (acres)	1,161,385,600	1,161,385,600	.....	.....
Improved land in farms (acres)	[a]173,433,209	[b]119,709,592	53,723,617	44.9
Total value of farm land	[a]$10,488,460,215	[b]$3,249,259,472	$7,239,200,743	222.8
Average value per acre of farm land	[a]$26.99	[b]$9.42	$17.57	186.5
Number of farms irrigated	157,862	107,716	50,146	46.6
Area irrigated (acres)	13,739,499	7,527,690	6,211,809	82.5

[a] 1910. [b] 1900.

The total cost of the irrigation systems reported in arid and semiarid States in 1910 was $304,699,450 against $67,482,261 in 1899. The average cost per acre was $15.76 in 1910 and $8.89 in 1898.

The acreage irrigated in 1909, as classified according to the state and federal laws under which the works were built or are operated, are as follows: United

States Reclamation Service 395,646 acres, United States Indian Service 172,912 acres, Carey Act 288,553 acres, irrigation districts 533,142 acres, cooperative enterprises 4,646,039 acres, commercial enterprises 1,444,806 acres, and individual or partnership enterprises 6,258,401 acres.

The leading food crops of the United States (*U. S. Dept. Com. and Labor, Bur. Census* [*Press Bul.*], *1911, Dec. 14, folio*).—This is a preliminary statement issued by the Bureau of the Census which presents statistics and other data relative to the acreage, production, average yield per acre, and average number of bushels per capita, together with figures for the imports and exports, of the principal food crops in the United States for 1909, with comparisons with the same crops for 1899.

It is pointed out that the total amount of land used for producing the 5 leading crops, corn, wheat, potatoes, sweet potatoes, and rice, was 151,321,000 acres in 1899 and 147,555,000 acres in 1909, a decrease of 2.5 per cent, whereas the population during the same period increased 21 per cent. This decrease in acreage was entirely in wheat, for which the area fell off 15.8 per cent while the yield increased 3.8 per cent. The area planted in corn increased 3.7 per cent, with a decrease in the average yield per acre from 28.1 bu. in 1899 to 25.9 bu. in 1909. There were marked increases in both the acreage and yield of potatoes, sweet potatoes, and rice.

Poultry on farms in continental United States (*U. S. Dept. Com. and Labor, Bur. Census* [*Press Bul.*], *1911, Dec. 28, folio*).—This is a press bulletin from the Bureau of the Census showing that 5,585,032, or 87.8 per cent of the total number of farms in the United States, reported poultry in 1910. The number of fowls reported was 295,880,000 against 250,624,000 in 1900 with an average value of 52 cts. each, an increase of 18 cts. per fowl since 1900. About 95 per cent of the total were chickens. A decrease of 44.1 per cent is noted in the number of turkeys, 39.3 per cent in the number of ducks, and 21.9 per cent in the number of geese as compared with 1900.

Tables are also given showing the distribution of fowls by geographical divisions. It is noted that 55.9 per cent of the total value of poultry in the United States is found in the following 10 States, ranking in the order named: Iowa, Missouri, Illinois, Ohio, New York, Indiana, Pennsylvania, Kansas, Michigan, and Texas.

Marketing grain and live stock in the Pacific coast region, F. ANDREWS (*U. S. Dept. Agr., Bur. Statis. Bul. 89, pp. 94, figs. 2*).—This bulletin points out that the production and marketing of grain on the Pacific coast is of particular economic significance to the United States by reason of the fact that the farmer there looks to European ports and not to grain centers of the United States for his markets. The same is true as to live stock although not to such a marked degree.

It is shown that the grain of the Pacific coast is carried 18,000 miles by sea to the English miller cheaper than by the 2,000-mile haul across the mountains to milling centers in the Mississippi Valley. For instance the total ocean freight rate and marine insurance on wheat to England is estimated at from 16.75 to 22.5 cts. per bushel from Sacramento and 39.0 cts. to Chicago. Corresponding rates from Pendleton, Oreg., and Spokane and Walla Walla, Wash., are estimated at from 24.25 to 31.2 cts. to England and 34.5 cts. to Chicago.

The approximate cost for marketing in England wheat from country shipping points in Oregon, Washington, and Idaho, including commission, warehouse, and freight charges, etc., is roughly estimated at from 18.606 to 40.525 cts. per bushel, and that of barley at from 14.707 to 34.025 cts.

Other data are given and discussed showing the present status of the domestic and foreign trade in grain and livestock, transport facilities, freight rates, farm prices in different sections, difference in price between farm and England, cost of marketing, methods of marketing, comparisons with exchange prices and export values, classes and amounts of exports, together with other notes and tables showing changes in trade movements, etc., for a period of years.

Imports of farm and forest products, 1908–1910, by countries from which consigned (*U. S. Dept. Agr., Bur. Statis. Bul. 90, pp. 80*).—Statistical data showing the value of imports of farm and forest products into the United States from 1851 to 1910, with total imports by grand divisions and countries from which consigned, 1908–1910, are here reported.

The value of farm products imported into the United States during the year ended June 30, 1910, amounted to $687,509,115, an increase of $48,896,423 over the previous year, and these imports formed 44.2 per cent of all imports. The value of imports of forest products in 1910 amounted to $178,871,797, an increase of $54,951,671 over 1909 and of $81,138,705 over 1908. The increase of 1910 over 1909 was largely due to increased imports of India rubber. See also previous notes (E. S. R., 24, p. 91).

Exports of farm and forest products, 1908–1910, by countries to which consigned (*U. S. Dept. Agr., Bur. Statis. Bul. 91, pp. 96*).—Statistical data of exports of farm and forest products including the countries to which consigned are here reported.

The exports of domestic farm products in 1910, valued at $871,158,425, were less than in any fiscal year since 1905. The exports of domestic forest products were $85,030,230, an increase of $12,587,776 over 1909. The decrease in farm products is stated to be mostly due to a falling off in the consignment of cattle, wheat, wheat flour, fresh beef, bacon, hams, and pickled pork to the United Kingdom; wheat to Belgium, Germany, Italy, and the Netherlands; lard to Germany; and cotton to Japan. See also previous notes (E. S. R., 24, p. 191).

Russian cereal crops: Area and production by governments and provinces, E. T. Peters (*U. S. Dept. Agr., Bur. Statis. Bul. 84, pp. 99, pl. 1*).—This is a report by regions, governments, and provinces as to the acreage, yields, and other data for wheat, rye, barley, oats, and corn, the chief cereal products of Russia. It covers the period 1901–1908 and in less detail the years 1909 and 1910. The data are so presented as to show readily the relative importance of these cereals in each region and in the entire country, including tables showing the annual acreage, area, and production of these crops.

It is noted that the aggregate area under the 5 crops for 1906–1908 shows an increase of 3.7 per cent over that for 1901–1905, but that, owing to unfavorable seasons, the increased area was accompanied by a decrease of more than 7 per cent in the aggregate product. Comparing the Russian averages of production with like averages for the United States for the period 1901–1908, the following is noted: Against the Russian average of 17,044,408 tons of wheat, 23,060,883 tons of rye, 8,016,569 tons of barley, 13,954,347 tons of oats, and 1,436,711 tons of corn, there was an American average of 20,008,778 tons of wheat, 860,503 tons of rye, 3,457,253 tons of barley, 13,766,122 tons of oats, and 68,789,723 tons of corn.

The data presented are discussed in detail.

The American Farm Management Association (*Amer. Farm Management Assoc. Rpt., 1 (1910), pp. 8*).—This is a report of the first annual meeting of this association, held at Ames, Iowa, July, 1910 (E. S. R., 23, p. 407). It contains among other data an analysis of the rural problem by K. L. Butterfield, a report as to the scope and cleavage of farm management, and a suggested course of study.

AGRICULTURAL EDUCATION.

Report of the Rural Education Conference on a suggested type of agricultural school (*London: Bd. Agr. and Fish. and Bd. Ed., 1911, pp. 27*).—This is a report of the Rural Education Conference which was appointed by the presidents of the Board of Agriculture and Fisheries and the Board of Education, in 1910, to report, among other matters, on the question "as to whether there is any place in the system of rural education, either generally or in particular counties in view of special local conditions, for schools giving to boys leaving elementary schools a 3-year course, from the age of 12 or 13, in the theory and practice of agriculture, together with continued general education."

Among the findings of the committee are that the school in question would not be practicable for boys who are to become agricultural laborers. There appears to be a consensus of opinion among practical agriculturists that these boys should get on the land and into practical work as soon as possible after leaving the elementary schools. In this connection the committee considers a centralized rural continuation day school, where boys actually engage in work on the land between the ages of 12 and 16, or even 18, might be brought in several groups for 1 or 2 days a week to receive instruction in elementary science and rural economics. It is also deemed necessary to extend and develop the manual instruction and nature-study teaching given in the upper classes of rural elementary schools.

It is deemed essential that boys who intend to become farmers or workers of small holdings, in addition to becoming familiar with the practical work of the farm, should not leave school without acquiring a good knowledge of the theory and practice of agriculture, together with a good general education, both literary and scientific. For these boys a trial could be made of what might be called a higher-grade rural school which would not be unlike the agricultural section of the French "ecole primaire superieure." The instruction in these schools should include practical gardening and other manual instruction, as well as nature study, elementary science, mensuration, and surveying, and rural economy.

Attached to the report are appendixes giving a list of the witnesses, notes of the various types of schools which were considered, notes submitted to the committee by individuals, and summaries of the evidence.

Agricultural education in the Republic of Argentina (*An. Soc. Rural Argentina, 1910, Nov.-Dec., pp. 144–153, pl. 1, figs. 8*).—This statement, issued by the division of agricultural education of the Rural Society of Argentina, outlines the system of agricultural education prepared in April, 1907, by an advisory commission on agricultural education, which became effective in December, 1907.

The system comprises (1) higher instruction in agriculture by the faculties of agriculture and veterinary science of the national universities at Buenos Aires and La Plata; (2) technical practical instruction in professional schools of viticulture, arboriculture, sugar technology, agriculture, etc., of a distinctly local character; (3) practical instruction for the future agriculturists, horticulturist, dairyman, etc., by regional schools of agriculture; and (4) extension work, including courses for youths and adults, itinerant instruction, an information service, cooperative experiments, local exhibits, aid to local agricultural associations and syndicates, organization of regional "agronomes," and instruction to soldiers. Brief accounts of the object and subjects of instruction of individual schools are given.

Report of the commission upon the plans for the extension of industrial and agricultural training (*Madison, Wis., 1911, pp. 135*).—The report of the commission on education submitted to the Wisconsin legislature of 1911 consists of a direct study of the relation of industry to education. The section on agricultural education deals with the part that the various classes of schools from the district school to the university should play in the development of rural education. Under each heading is to be found a brief analysis of the facts that obtain in each class of schools, with suggestions as to the possibilities of future development and specific recommendations for constructive legislation.

How we cooperate with the public schools (*Col. Agr. Univ. Calif., Spec. Circ.* [*1911*], *pp. 4*).—The purpose of this circular is to indicate briefly the different ways in which the College of Agriculture of the University of California is cooperating with the high schools and public schools of the State.

Second annual report of the Congressional district agricultural schools of Georgia, J. S. Stewart (*Bul. Univ. Ga., 1911, No. 149, pp. 31, figs. 15*).—Among other matters this report gives a condensed statement of a tentative course of study for each school, the number of students in each school by years, a financial statement regarding the crops grown, and data as to the equipment and financial standing.

Outline of requirements for the common schools of Oklahoma, R. H. Wilson and E. F. Proffitt (*Oklahoma City: State Bd. Ed., 1911, pp. 32*).—A detailed course in agriculture has been arranged for the sixth, seventh, and eighth grades, and suggestions are made for its adjustment to the other work of the schools.

School gardening in Hawaii as related to agricultural education, V. MacCaughey (*Hawaii. Forester and Agr., 8 (1911), No. 8, pp. 240–245*).—In this paper, which was read at the convention of the National Education Association in San Francisco, in 1911, the author discusses the general conditions of life in Hawaii and outlines a system of industrial education with which school garden enterprises will be closely articulated. The plan proposed is the establishment on each of the 4 islands of Kauai, Oahu, Maui, and Hawaii, of schools contiguous to important industrial centers, these schools give to practical instruction in agriculture, home economics, trades, and industries.

In describing the present condition of school gardens, the author quotes from a recent report of the school-fund commission showing that 9,309 pupils are engaged in gardening, and more than 125 schools are actively engaged in agricultural work, 2 schools planting sugar cane on a commercial basis. The work consists of clearing and preparing land, keeping grounds in order, vegetable and flower gardening, and tree planting.

The practical aspects of science in secondary education: The pedagogical viewpoint, W. R. Hart (*Addresses and Proc. Nat. Ed. Assoc., 48 (1910), pp. 466–472; Mass. Agr. Col., Dept. Agr. Ed. Circ. 9, 1910, pp. 466–471*).—In this discussion of the pedagogical viewpoint in the practical application of the sciences in secondary education, the author considers such matters as utility, interest, and correlation. He contends that the concrete should precede the abstract, this meaning not merely the objective or sensible but the economic and sociological, in other words the vocational.

Introduction to general science, P. E. Rowell (*New York, 1911, pp. XXIX+302*).—This is an outline for a course in general science which includes among other agricultural topics the soil and its management, fertilizers, humus, irrigation, drainage, the function of roots and leaves, and the propagation and breeding of plants. Experiments and references for collateral reading are found throughout the book.

One hundred lessons in agriculture, A. W. NOLAN (*Chicago, [1911], pp. 351, pls. 4, figs. 102, dgms. 4*).—It has been the aim of the author in the preparation of this text-book and manual to select such subject-matter, materials, and methods as the teacher in the one-room country school, the grammar grades of a graded school, or the beginning years of a high school, may find easily practical, within the range of the pupil's understanding, and of educational value.

The feature of the book is the arrangement of the work in the order of seasonal sequence of subject-matter, following the actual farm operations and interests throughout the year. Many of the lessons are followed by a set of practical farm problems and references to Farmers' Bulletins which may be used as collateral reading. The appendix contains a suggestive list of materials and equipment needed in using the book, as well as a score-card for farms, and diagrams of a cow, sheep, chicken, and horse.

Courses of reading and examination in practical agriculture, P. CARMODY (*Dept. Agr. Trinidad Circ. 3 [1911], rev. ed., pp. 5*).—This circular outlines the requirements for examinations which are to be held periodically in Trinidad for the purpose of affording persons engaged in practical agriculture opportunities for obtaining certificates of competency, and suggests literature to be read in preparation for these examinations. The examinations will be graded as preliminary (in the general principles of agriculture), intermediate (comprising insects, fungi, and special crops), and final (embracing a fuller knowledge of special crops, estate management and control, diseases of plants and their treatment, etc.).

Laboratory material for instruction in field crops (*Univ. Nebr. [Pamphlet, 1911], pp. 15, figs. 4*).—This pamphlet describes a collection of laboratory material on field crops designed primarily for Nebraska schools and conditions for 1911–12. The material is arranged in lots and includes, exclusive of corn, the principal cereals and cultivated forage grass types, put up in bundles ranging from 1 to 25 specimens per type, as well as in the threshed condition. There are also ear samples of the various corn types and 10-ear exhibits.

Veterinary instruction, G. R. P. D'UTRA (*Rev. Vet. e Zootech., 1 (1911), No. 1, pp. 30–41*).—The author reviews the condition of veterinary science before the foundation of special veterinary schools, when and how veterinary instruction was organized, the development of this instruction in France, and the present status and principal aim of instruction in veterinary medicine.

A selected bibliography on rural social science (*Mass. Agr. Col. [Pamphlet], 1911, pp. 11*).—This annotated bibliography does not cover more than a selected group of representative books, reports, bulletins, and other publications in any particular field, although there is given a fuller list in some fields than in others. The titles have been selected, and the annotations made, chiefly with reference to the needs of practical rural workers and leaders. It is divided into general works, agricultural economics, the rural school, the rural church, rural health, and miscellaneous references.

Neighborhood improvement clubs for the rural, village, and town communities of Kansas, E. L. HOLTON (*Agr. Ed. [Kans. Agr. Col.], 4 (1911), No. 3, pp. 13*).—In this pamphlet may be found (1) a suggestive constitution for a neighborhood improvement club, (2) methods for work such as surveys of the actual economic, social, health, moral, and educational conditions in the neighborhood, (3) topics for discussion in regular meetings, and (4) hints for a small working library.

Handbook of nature study, ANNA B. COMSTOCK (*Ithaca, N. Y., 1911, pp. XVII+938, pl. 1, figs. 702, dgms. 6, maps 5*).—The leaflets upon which this volume is based were published in the home nature-study course given at

Cornell University during the years 1903–1911. The subject-matter is essentially the same as in the leaflets, but the lessons have all been rewritten with a view to consistency, and many new lessons have been added to bridge gaps and make a coherent whole.

The book is divided into 4 parts. Part 1 deals with the teaching of nature study, part 2 with animal life, part 3 with plant life, and part 4 with the earth and sky. In the consideration of each subject there is usually the teacher's story, and then the lesson, which is made up of a leading thought, a method, and observations put in the form of questions, besides supplementary reading.

Nature study by grades, H. H. CUMMINGS (*New York, Cincinnati, Chicago [1909], pp. VIII+208, figs. 54*).—The object of this text-book of nature study for the lower grammar grades, which is the second of the series entitled Nature Study by Grades, is to aid both teachers and pupils in an examination of matter in every school environment, to organize and direct investigations into the secrets of nature, and to stimulate observation and inference. The subjects form the basis of the fourth year's work in nature study and are adapted to the 3 seasons—fall, winter, and spring. The lessons consist of suggestions to the teacher, questions, and problems. Few explanations are given in the text.

How to teach nature study, T. W. HOARE (*London, 1910, pp. XXII+316, figs. 73*).—This practical working guide for teachers contains an introductory statement of what nature study is, why and how it should be taught, how it should not be taught, and the influence of nature study. This is followed by a typical scheme of work for nature-study teaching in a primary school for pupils up to 13 years of age, a scheme of work suitable for supplementary classes or for an intermediate school for pupils from 12 to 15 years of age, and lessons on such topics as butterflies, moths and silkworms, climbing plants, buds and twigs, ice and snow, how a soil is formed, seeds, movements and functions of water, ants and spiders, preserving and mounting plants, and the physical composition of the atmosphere.

Gardening and farming, ELLEN E. SHAW (*New York, 1911, pp. 376, pls. 9, figs. 19*).—This book belongs to the Children's Library of Work and Play.

The contents are divided into 2 parts, the first dealing with garden clubs, improving the school grounds, the corn contest, and the garden experiments performed indoors, and the second presenting garden talks on such subjects as the soil, plant food, garden operations, garden pests, vegetable and flower culture, and landscape gardening.

Outdoor work, MARY R. MILLER (*New York, 1911, pp. XII+519, pls. 13, figs. 54*).—This book belongs to the Children's Library of Work and Play, and takes the form of confidential talks for young people. The titles of some of the chapters are raising domestic animals, keeping bees, making collections, harvesting nature's crops, and making the country a better place to live in. Instructions are given in the appendix on how to get free printed matter relating to outdoor work subjects. A list of useful books, magazines, and other publications on various outdoor occupations is also given.

The relation of the county superintendent of education to the boys' corn club work: How to organize a club, L. N. DUNCAN (*Alabama Col. Sta. Circ. 9, pp. 2–8*).—The organization and growth of boys' corn club work in Alabama is outlined. A suggested constitution and by-laws, as well as directions for organizing a corn club, are given.

Michigan state farmers' institutes, 1909–10, L. R. TAFT (*Mich. Bd. Agr., Inst. Bul. 16, 1910, pp. 160, figs. 3*).—Besides a summary of the work accomplished through the one-day and two-day institutes and the institute trains, a very complete report of the proceedings of the round-up institute is given.

Some of the subjects discussed are: (1) Agricultural Education in the Public Schools, by W. H. French, (2) The Schools from the Farmers' Standpoint, by W. F. Taylor, (3) Women's Share in Agriculture, by Martha Van Rensselaer, (4) Art in the Home, by V. T. Wilson, and (5) Changing Educational Ideals, by Maude Gilchrist.

Michigan state farmers' institutes, 1910–11, L. R. TAFT (*Mich. Bd. Agr., Inst. Bul. 17, 1911, pp. 263, figs. 37*).—A summary of the work done through the year is given as well as a brief report of the method of conducting the regular county institutes and the institute trains. Some of the papers presented at the round-up institute are as follows: (1) Heating of Residences, by G. W. Bissell, (2) Better Boys and Girls on the Farm, by W. A. McKeever, (3) Some Practical Aspects of Race Breeding, by W. A. McKeever, (4) Training Teachers for Agricultural Extension Work, by John Hamilton, and (5) Business Methods on the Farm, by Ida L. Chittenden.

MISCELLANEOUS.

Twenty-ninth Annual Report of New York State Station, 1910 (*New York State Sta. Rpt. 1910, pp. 607, pls. 51, figs. 8, charts 2*).—This contains the organization list of the station, a financial statement for the federal funds for the fiscal year ended June 30, 1910, and for the state funds for the fiscal year ended September 30, 1910, reprints of Bulletins 322, 323, 326–332 and Technical Bulletins 13–17, all of which have been previously noted, and of Circulars 13–15, noted elsewhere in this issue, a list of the periodicals received by the station, and meteorological observations noted on page 214 of this issue.

Thirtieth Annual Report of Ohio Station, 1911 (*Ohio Sta. Bul. 230, pp. XXVII, fig. 1*).—This contains the organization list, a report of the board of control, a financial statement for the fiscal year ended June 30, 1911, and a report of the director summarizing the work of the station during the year.

Press bulletins (*Ohio Sta. Bul. 230, pp. 356–362*).—Reprints of press bulletins on the following subjects: The station exhibit at the county fairs; the Fusarium blight or wilt of potatoes; sowing wheat late in the fall; treating seed wheat for smut; small tools on the farm; mice injury to forest trees; testing seed corn; and preventing onion smut.

Experiment Station Work, LXVI (*U. S. Dept. Agr., Farmers' Bul. 469, pp. 24, figs. 9*).—This number contains articles on the following subjects: Permanent lawns in the South, fertilizing asparagus, turnips for sheep, loss of winter-fed lambs, cost of market milk, propagation of starters for butter making and cheese making, and the plastered silo.

NOTES.

Delaware Station.—Thomas F. Manns, soil bacteriologist of the Ohio Station, has accepted the position of plant pathologist and soil bacteriologist beginning April 1.

New Jersey College and Stations.—The new entomology building has been completed and the equipment of the department installed. The poultry buildings and the greenhouses have also been occupied, and experimental work has been started in poultry husbandry and floriculture.

Alfred S. Cook, of the Dairy Division of this Department, has been appointed dairy husbandman of the State Station. Walter W. Shute, farm foreman in the State Station and instructor in the short courses in agriculture, resigned November 1, 1911, to accept a position as farm manager. Vincent J. Carberry, assistant chemist in the fertilizer department, who has been on leave of absence, died November 24, 1911, at the age of 33 years, 18 of which had been in connection with the station.

Cornell University.—The poultry husbandry building, for which a State appropriation of $90,000 is available, is now under construction. A three-story and basement building is planned to accommodate classes of from two to three hundred. The structure is to be 132 feet long, 48 feet wide in the center, and 37 feet wide at the ends.

The first floor and basement are given over to the practice courses, receiving room, killing room, egg-testing and handling rooms, and the commercial phases of administration. The second floor contains general and private offices and laboratories, a library and exhibition room, a seminar room, and headquarters for the university poultry association. On the third floor are a large lecture room, laboratories, a photographic room, and a recitation room. Auxiliary incubator and brooder houses and a judging pavilion are also projected, to be constructed adjoining the building.

Ohio Station.—C. C. Hayden, assistant professor of dairy husbandry at the Illinois University and assistant chief of dairying in the Illinois Station, has accepted the position of chief in dairying. The station is being asked for advice in the management of the large dairy herds belonging to some of the state hospitals and similar institutions under a new law which has unified the management of these institutions and authorizes them to call on the station for such service.

Oregon College.—Mrs. Margaret P. Macpherson, of the Michigan College, has been appointed instructor in botany.

Porto Rico Sugar Planters' Station.—T. H. Jones, of the Bureau of Entomology of this Department, has been appointed assistant entomologist.

Rhode Island College and Station.—Benjamin F. Robinson, of Wakefield, has been appointed to succeed Jesse V. B. Watson on the board of managers.

The board of visitors has just rendered a report very favorable to the work of the college, in which it recommends even more liberal provision for buildings and equipment than had been contemplated. A bill has just been introduced in the general assembly, which provides for an appropriation of $75,000 for a new science building to accommodate the departments of botany, zoology, geology, chemistry, and bacteriology of the college and the division of biology of the experiment station.

EXPERIMENT STATION RECORD.

VOL. XXVI. MARCH, 1912. No. 4.

Data recently compiled in this Office bring out some very interesting facts concerning the rapid development of college and school courses in agriculture in the United States since the publication of similar data in May, 1910. In this interval of less than two years the total number of institutions of all kinds reporting students in agriculture has almost trebled. From a total of 864 such institutions in 1910, the number has now increased to 2,546. This increase is at an average rate of seventy-six institutions a month.

As might be expected, the number of collegiate courses in agriculture has not increased. Although there are now sixty-one collegiate courses, as compared with fifty-seven in 1910, the increase is due to the establishment of college courses in forestry in four institutions. There is a considerable increase in the number of privately endowed colleges reporting courses in agriculture, but on account of the nature of their work in agriculture these colleges are listed among the secondary institutions.

In most cases these privately endowed colleges disclaim any intention of trying to compete with the State colleges of agriculture, frankly announcing that their work is secondary or "practical." More than two-thirds of the institutions of this class are in the Mississippi Valley, Nebraska having eight, Illinois six, and seven other States from one to three each. Two of these secondary courses are horticultural, maintained in well-known colleges for women in Massachusetts, and two of the agricultural courses are given by prominent universities in New York.

The largest numerical increase in agricultural courses has been among institutions offering secondary courses, of which there are now listed 2,154, as compared with 630 in 1910. These include the forty privately endowed colleges mentioned above, thirty-five State colleges of agriculture offering secondary courses in agriculture, and a large number of agricultural high schools and public and private high schools and academies. In making up this list only those institutions reporting students in agriculture as a separate subject of instruction have been included, and in the case of high schools and academies which are also doing grammar-school work the enrollment of students of agriculture in one or more high-school years of the course has been the basis for admission to the list.

The normal schools are not here included in the list of secondary institutions, because their work in agriculture is in many cases purely elementary. They will be mentioned elsewhere. The institutions for Indians have also been omitted from the list of secondary schools because of the difficulty of properly classifying them at the present time. They are included among the elementary schools.

The number of technical agricultural schools of secondary grade, aside from those maintained in connection with the agricultural colleges, increased from sixty in 1910 to eighty-eight at the present time. Eight of these are private schools. The remaining eighty are maintained wholly or in part by State funds in some seventeen States, and entail an annual expenditure by the States in which they are located of over $780,000 for instruction and maintenance, not counting large expenditures for land, buildings, and equipment. These are institutions which undertake definitely to prepare young men for the business of farming and young women for home making. Their courses are vocational rather than cultural or preparatory and they compete little, if at all, with the agricultural colleges or the public high schools.

The area served by these agricultural schools varies in different States from a single county to a large indeterminate section. In Maryland, Michigan, Mississippi, North Carolina, North Dakota, and Wisconsin the county unit has been adopted; in Alabama and Georgia the congressional district has been adopted as the unit, and in Oklahoma the supreme court judicial district; while in California, Colorado, Massachusetts, Minnesota, Nebraska, New York, Pennsylvania, and Vermont the agricultural schools are located without reference to such divisions of the State and serve indeterminate areas.

Wisconsin was the first State to establish county agricultural schools. In 1911 that State had five such schools in operation, Maryland had two, Michigan two, Mississippi twenty-three, and North Carolina four. Alabama was the first State to provide a complete system of agricultural schools by congressional districts, of which it has nine, and was followed by Georgia with eleven district schools. Oklahoma has an agricultural school in each of its five judicial districts and one additional school in the "Panhandle."

Of the schools located without reference to special divisions of the State, California has two, Colorado and Minnesota two each, New York three, and Massachusetts, Nebraska, Pennsylvania, and Vermont one each.

The number of public and private high schools and academies receiving students in agriculture has now reached 1,886. Two hundred and eighty-five of these inaugurated courses in agriculture under the stimulus afforded by State aid, while 1,601 started the work without such aid. In 1910 there were only four hundred and thirty-two of

the unaided high school departments of agriculture, a little more than one-fourth of the present number. The largest number of unsubsidized high school courses in agriculture is found in Ohio, which reports three hundred and thirty-six. Nebraska has one hundred and ninety-one, Missouri one hundred and sixty-seven, and Wisconsin one hundred and three. The U. S. Bureau of Education reports that in 1910 there were over thirty-seven thousand pupils in agricultural courses in the public and private high schools of the country. The number is undoubtedly much larger this year.

State aid to stimulate the introduction of courses in agriculture, home economics, and manual arts into public high schools was first definitely provided for in Virginia in 1908, when the general assembly appropriated $10,000 to be used for that purpose in at least one high school in each of the ten congressional districts in the State. Virginia was followed in 1909 by Maine and Minnesota, in 1910 by Louisiana, Maryland, and New York, and in 1911 by Kansas, Massachusetts, North Dakota, Texas, and Wisconsin. In the spring of 1910 there were twenty-eight subsidized courses in agriculture in public schools; to-day there are more than ten times as many. Kansas has the largest number of subsidized courses in agriculture—an even hundred; Minnesota has eighty, Texas thirty-four, Louisiana twenty-five, and six other States have from one to seventeen.

The amount given to each school varies from $250 in Kansas to $4,000 in Virginia. Minnesota devotes $125,000 annually to this work. The total expenditures for subsidies in 1912 will approximate $400,000. This will include subsidies for home economics and manual arts in all of the subsidized schools except those in two States which subsidize agriculture alone, and in two other States which subsidize agriculture and home economics. Virginia is the only State that subsidizes extension work done by public high schools.

No attempt has been made to list the elementary schools teaching agriculture, except in the case of industrial, eleemosynary, and special agricultural schools, of which there are thirty-seven for whites, one hundred and twelve for Indians, and fourteen for negroes. In addition to these, there are of course many hundred public elementary schools in which some instruction in agriculture is being given. Twelve States have passed laws requiring the teaching of agriculture in all common schools, five others require it in all the rural schools, and three others require it in the rural high schools.

The preparation of teachers to give instruction in agriculture is one of the serious problems confronting the promoters of this movement. That and the inability of many schools to pay large enough salaries to retain good teachers are the principal causes that prevent the development of agricultural teaching at even a more rapid rate than it is now progressing. With a view of insisting upon some

knowledge of agriculture on the part of teachers, sixteen States have passed laws requiring teachers to be examined in this subject; but it has been found that these requirements alone do not solve the problem.

The facilities for training teachers along vocational lines are inadequate. The State normal schools are doing what they can to prepare their students for such work, but the time that can be given to vocational subjects in a year or two in the normal school is extremely limited; and besides, the normal schools enroll only a small percentage of those who teach in the rural common schools. Their students go largely into the grade work of village and city schools. Out of a total of about two hundred normal schools, one hundred and fourteen of those for whites and thirteen of those for negroes are giving instruction in agriculture.

In addition to these, there are in Kansas, Michigan, Nebraska, and Wisconsin about two hundred and eighty high-school normal training courses of one or two years in length, which include some work in agriculture. It is said that a large percentage of those who graduate from these training courses go directly into the rural schools, and while the training they get in this way is by no means adequate, yet it is better than that secured by the average rural teacher. With the State normal schools and these training courses there are now over four hundred institutions giving instruction in agriculture to prospective teachers in the elementary grades, and while the meagerness of the instruction they can give in agriculture is to be deprecated, it is nevertheless encouraging to know that something in this line is being done in such a large number of institutions.

Trained teachers for the high-school courses in agriculture are also scarce. The graduates of the four-year courses in the colleges of agriculture find such attractive opportunities in farming or the salaries offered them by agricultural colleges or experiment stations are so large that teaching in the public high schools as a profession does not appeal to many of them. The initial salaries offered by high schools may be as good or sometimes better than these graduates could command in other lines of professional or practical work, but the outlook for permanent employment and for increasing returns as the years go by is not so good.

The condition with reference to teachers of agriculture is somewhat better in the special agricultural schools and the subsidized agricultural departments in public high schools than in the ordinary public high schools. In the former the employment of trained teachers of agriculture is usually one of the conditions upon which State aid is given. The permanence of agriculture in these schools is assured, and, furthermore, the funds from the State treasury enable the local authorities to pay relatively high salaries without seriously affecting local taxation. Under such conditions the teach-

ing positions in the vocational subjects are sufficiently attractive to secure the favorable consideration of agricultural college graduates.

The agricultural colleges are helping to solve the teacher problem. To meet the present emergency among teachers now in service, they are holding summer schools, conducting traveling schools in connection with teachers' institutes, and offering special courses in agricultural subjects for the graduates of other colleges and of normal schools. This undoubtedly is work that needs to be done in all parts of the country.

Recent experience indicates that many of the successful teachers now in service, after taking short courses of a few months or a year devoted almost exclusively to agriculture and methods of teaching it, are likely to become our most successful high-school teachers of agriculture. They have already acquired the high-school point of view, they know the limitations of high-school pupils, and they are not likely to attempt college work in high-school classes. Their college work in a new and inspiring subject of study gives them renewed freshness and enthusiasm, and they readily see the possibilities of agriculture without being led unduly to magnify its importance.

In other ways the agricultural colleges are beginning to make their influence felt in the teaching profession. The Bureau of Education reports that thirty-six of the colleges for white persons now offer their students some opportunities to fit themselves as special teachers of agriculture for high-school work. Some of these offer only certain courses in general education, elective to students in agriculture; a larger number offer courses in general education and special courses in agricultural education; a few which have departments of education allow students in these departments to elect courses in agriculture; while nine institutions offer prescribed four-year courses for teachers. This feature of agricultural college work has grown rapidly in the past two years, and it will probably develop more rapidly in future.

Whatever the agricultural colleges may have done in a special way to encourage the teaching of agriculture in high schools, an examination of the statistics of high-school courses indicates pretty clearly that their influence upon this movement has been productive almost in direct proportion to their activity. As evidence of this it may be said that over eighty per cent of the high schools teaching agriculture are in eighteen States having in their agricultural colleges some definite organization—an extension department, a department of agricultural education, a teachers' course in agriculture, or some other definite agency—for reaching the public schools. And if the four or five States were selected which are showing the largest results in public-school work in agriculture these would be found to be States whose colleges of agriculture have been longest in this field and most active in its cultivation.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Handbook of biochemistry of man and animals, edited by C. OPPENHEIMER (*Handbuch der Biochemie des Menschen und der Tiere. Jena, 1909–10, vols. 1, pp. XXIV+932, figs. 43; 2, pt. 1, pp. IX+720, figs. 12; pt. 2, pp. VII+391, fig. 1; 3, pt. 1, pp. XII+783, figs. 6; pt. 2, pp. VII+348; 4, pt. 2, pp. VI+595, figs. 9; 1911, vol. 4, pt. 1, pp. VII+885, figs. 8, dgms. 16*).—This work constitutes a handbook of biological chemistry of man and animals, and provides a digest of laboratory methods, experimental research, and theoretical matter. The different chapters are contributed by specialists, and throughout references are given to original sources of information. Parts of the work have already been noted (E. S. R., 25, p. 609).

Volume 1 deals with the chemical constituents of animal substance; volume 2, part 1, with the biochemistry of the cell, and part 2, with the biochemistry of tissues and organs; volume 3, part 1, with glands and their excretions, and part 2, with nutrition, digestion, and resorption; and volume 4, part 2, with energy metabolism, metabolic relations of mother and fetus, metabolism under pathological conditions, total metabolism of nonmammalian vertebrates and invertebrates, and the physico-chemical basis of ferment action.

General index of the Zeitschrift für Angewandte Chemie, 1887–1907, compiled by B. RAFFOW and E. M. MÜLLER (*General Register der Zeitschrift für Angewandte Chemie, Jahrgänge 1887 bis 1907. Leipsic, 1910, pp. 609*).—This is the name and subject index for this journal from 1887 to 1907.

On the "heat coagulation" of proteins.—II, The action of hot water upon egg albumin and the influence of acid and salts upon reaction velocity, HARRIETTE CHICK and C. J. MARTIN (*Jour. Physiol., 43 (1911), No. 1, pp. 1–27*).—Some of the conclusions drawn from this study of coagulation of egg albumin from the standpoint of physical chemistry are given below. See also previous work (E. S. R., 23, p. 612).

"'Heat coagulation' of egg albumin consists of two processes, viz, (1) the reaction between the protein and hot water ('denaturation'), and (2) the separation of the altered protein in a particulate form (agglutination).

"The action of hot water on egg albumin, which constitutes the first stage in 'heat coagulation,' is, if means be taken to prevent change in acidity during the process, a reaction of the first order. The same was previously found to be true for hemoglobin.

"During the process, as the protein is precipitated, free acid is progressively removed from the solution. The consequent progressive diminution in the acidity of the solution accounts for the fact that the reaction appeared to be of a more complicated character."

Further experiments on the fixation of acid by pure egg albumin in the cold, showing the relation of the amount of acid fixed to the acidity of the solution and the reversibility of the process are presented.

Sulphur linkages in proteins, T. B. JOHNSON (*Jour. Biol. Chem., 9 (1911), No. 6, pp. 439–448*).—From a summary of data the author concludes that prob-

ably there are other sulphur combinations in proteins besides the cystin group. The paper is an introduction to experimental studies of the subject.

The decomposition of proteins by electrical methods, C. SERONO (*Rend. Soc. Chim. Ital., 2. ser., 2 (1910), pp. 31–33*).—An application of electrolytic methods for studying the constitution of the protein molecule. The method and apparatus used are described in detail.

Direct measurements of the osmotic pressure of casein in alkaline solution, B. MOORE, H. E. ROAF, and A. WEBSTER (*Bio-Chem. Jour., 6 (1911), No. 1, pp. 110–121*).—This article offers experimental proof "that apparent impermeability of a membrane to ions is not due to the properties of the membrane but to the colloid contained within the membrane."

The newer progress made in experimental colloid chemistry as related to the proteins, H. HANDOVSKY (*Ztschr. Chem. u. Indus. Kolloide, 7 (1910), No. 4, pp. 183–193, fig. 1*).—This is a detailed review of the literature in this regard.

The synthesis of fats by the action of enzyms, F. L. DUNLAP and L. O. GILBERT (*Abs. in Science, n. ser., 34 (1911), No. 868, p. 220*).—An enzym in the seeds of the castor bean (*Ricinus communis*) was found to have synthesizing properties.

In regard to the decomposition of saccharin substances, A. JOLLES (*Biochem. Ztschr., 29 (1910), No. 1–3, pp. 152–201, figs. 3*).—The rotation of all the substances examined (rhamnose, cane sugar, lactose, maltose, dextrose, levulose, galactose, invert sugar, and arabinose) is with the exception of cane sugar diminished to a considerable degree when treated with an hundredth-normal alkaline solution at 37° C. A 1 to 2 per cent solution of dextrose was decomposed in a period of 24 hours.

Among the decomposition products formed at 37° there were acids, but acid formation from saccharose was very small. The rapidity of acid formation was found to be accelerated by the addition of oxidizers such as hydrogen peroxid and silver oxid, and diminished by excluding air. Arabinose, saccharose, and maltose yielded an acid the calcium salt of which gave Tollen's reaction for glucuronic acid and Bial's pentose reaction. In some cases the formation of acetaldehyde was observed. The formation of polyoxy acids in large quantities by excluding air was not observed. Formaldehyde produced a diminution in rotation. The determination of dextrose polarimetrically in an alkaline solution which has been allowed to stand for a few hours was found to yield inaccurate results, but on the other hand, when using Fehling's solution for the determination by reduction within a period of 24 hours correct results were obtained.

The author finally presents a hypothesis in regard to the decomposition of sugar in the animal organism.

Action of dilute aqueous solutions of ammonia and sodium carbonate upon various saccharin substances, A. JOLLES (*Biochem. Ztschr., 32 (1911), No. 2, pp. 97–100*).—From the results it was noted that centi-normal ammonia solution has no influence upon the rotation of arabinose, dextrose, levulose, galactose, and maltose in dilute aqueous solutions (from 0.2 to 1 per cent) if the solutions are allowed to stand for 24 hours at a temperature of 37° C., while on the other hand, with sodium hydroxid the rotation was often brought down to zero or near zero. Sodium carbonate was found to act less violently than the sodium hydroxid. According to the author, the decomposition of saccharin substances is dependent upon the hydroxl ion concentration.

A conjugated glycuronic acid from the sugar beet, K. SMOLENSKI (*Hoppe-Seyler's Ztschr. Physiol. Chem., 71 (1911), No. 3, pp. 266–269*).—The precipitates which were obtained by heating crude beet juice and extracting with absolute alcohol and water were treated with hydrochloric acid in order to

decompose the magnesium salt of glycuronic acid. The washed and dried substance so obtained was extracted with absolute alcohol and repeatedly recrystallized from alcohol. The yield was about 10 per cent of the initial crude material. The substance thus obtained was insoluble in water; slightly soluble in methyl alcohol, acetone, glacial acetic acid, and phenol; practically insoluble in ether, benzol, chloroform, and carbon bisulphid; but completely soluble in a dilute alkali or ammonia solution, and precipitable from such solutions with an acid.

The melting and decomposition point of the purest sample prepared was between 214 and 216° C. The specific rotation of a 2 per cent alcoholic solution for the various preparations was between $[\alpha]_D=+21.0°$ and $[\alpha]_D=+24.9°$. The elementary composition was carbon 66.09, hydrogen 8.58, and oxygen 25.33 per cent, corresponding to the formula $C_7H_{11}O_2$. The substance, according to the author, is probably the first conjugated glycuronic acid thus far obtained directly from the plant.

The action of the ultraviolet rays upon cane sugar, H. Bierry, V. Henri, and A. Ranc (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 23, pp. 1629–1632; abs. in Wchnschr. Brau., 28 (1911), No. 30, p. 336*).—The ultraviolet rays are capable of inverting cane sugar, and further of cleaving the hexoses thus formed to formaldehyde and carbon dioxid. In the presence of calcium carbonate no gas is evolved.

Fermentation and putrefaction, A. I. Kendall (*Abs. in Science, n. ser., 34 (1911), No. 868, pp. 218, 219*).—"As shown by the work of the author and others, utilizable carbohydrates protect nitrogen from attack by bacteria. . . . The two phenomena, fermentation and putrefaction, are antagonistic processes; the obligate putrefactive bacteria can not, as a rule, grow in media in which active fermentation is going on, because the acids produced inhibit their development. There is a third group, the facultative organisms, which are also able to adapt themselves to both kinds of food. This is an important new conception. Thus in the presence of dextrose the diphtheria bacillus elaborates no toxin, while in its absence large amounts are formed. *B. coli* behaves similarly. Not only do the products vary, but the composition of the bacteria themselves may be altered."

Influence of different temperatures on ferments and on the regeneration of fermentative properties, M. J. Gramenitzki (*Hoppe-Seyler's Ztschr. Physiol. Chem., 69 (1910), No. 3–4, pp. 286–300*).—It was noted that taka-diastase in aqueous solutions, when heated at a temperature of 80° C. for 1 hour, or to 115° for 15 minutes, loses its hydrolytic capacity. If it is heated for a short time at from 80 to 85°, the hydrolytic capacity lost may at times be regenerated at from 40 to 45° C., or by allowing it to stand at room temperature.

The oxidase (maltin, Merck) was found to retain its oxidizing power only slightly when heated at a temperature of 100° for 10 minutes. When it was heated for from 15 to 20 minutes its enzymatic power was lost, but recovered after some time. When exposed to a still higher temperature it lost its power permanently. If heated to 80°, oxidase in addition to recovering its oxidizing capacity also acquires the power of deoxidizing.

Maltin solution after being heated to 100° for 10 minutes retains its property of starch liquefaction in solution, but loses its capacity for sugar production.

The detection of small amounts of alcohol in fermenting fluids, A. Klöcker (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 1–4, pp. 108–111*).—The author has modified the old drop method as follows: Five cc. of the fluid is placed in a test tube 180 mm. long and 24 mm. wide. The tube is closed with a perforated stopper which contains a glass tube 80 cm. long and 3 mm. wide, the lower end of which runs to the lower level of the cork. The apparatus is placed obliquely

upon a wire netting and heated slowly with a small flame of a Bunsen burner. If alcohol is present the characteristic oil-drop effect will be noted in the tube.

On the presence of yeasts in fermenting tea and their probable influence on the aroma of tea leaves, C. BERNARD (*Bul. Dépt. Agr. Indes Néerland., 1910, No. 36, pp. 42, pls. 4; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 103*).—Micro-organisms in addition to unorganized ferments probably take part in the development of the aroma in tea. A yeast which almost always occurs among the other micro-organisms upon Java tea leaves was isolated. This seemed to have a favorable influence upon the fermentation process. The bacteria are harmful to the product.

The chemical composition of enzyms and their formation, II, H. EULER and BETH AF UGGLAS (*Hoppe-Seyler's Ztschr. Physiol. Chem., 70 (1911), No. 4–5, pp. 279–290; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 10, p. 412*).—It was found to make very little difference whether the water was removed from yeast by drying in vacuum or with absolute alcohol, and it is shown that Buchner's permanent yeast preparation can be taken as a measure for the study of the rate and the intensity of the activity of the invertase extracted from the yeast. Although the action of phosphates upon the activity of invertase is well known, the authors point out that the reaction of a medium, whether acid or neutral, has some influence upon this activity also. In a neutral medium the inversion goes on from 2 to 7 times quicker than in an acid medium. If the yeast is not dried a higher degree of fermentation is obtained by the addition of phosphates.

The authors as a result of their work set up the following hypothesis: Zymase exists in living yeast either partly or wholly as a chemical complex, which is bound to the protoplasm and the activity of which is checked partly or permanently when the vital process of the cell is hindered. The free portion (or that portion which is liberated during the dehydration process of the fermentation enzym) is the only one which is active during the process. The authors doubt the possibility of regenerating zymase.

Investigations in regard to the chemical composition and formation of enzyms, III, H. EULER and S. KULLBERG (*Hoppe-Seyler's Ztschr. Physiol. Chem., 71 (1911), No. 1, pp. 14–30; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 21–22, pp. 896–898*).—This article deals with the influence of phosphates upon the invertase- and zymase-system of living yeast cells and the dynamics of enzym reactions caused by these cells.

Action of the compounds of chromium and salts of magnesium, manganese, iron, and aluminum upon the amylolytic ferments, C. GERBER (*Compt. Rend. Soc. Biol.* [*Paris*], *70 (1911), No. 16, pp. 724–730; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 20, p. 849*).—Chromates were found to accelerate amylolysis up to a certain concentration, but above this concentration the action of the ferment is retarded. The accelerating action is combined with the action of acids, and the retardation is due to a destruction of the diastase. Neutral chromates in small quantities were found to act indifferently. The retarding action of large amounts of dichromates or neutral chromium salts was found not to be due to the destruction of the diastase. The same holds true for magnesium salts and manganese. Ferrous salts only retard the action of diastase, while ferric salts and aluminum compounds behave like the chromates.

The action of the alkali metal salts upon the saccharification of starch by proteolytic ferments.—IV, Neutral ammoniacal salts. V, Carbonates and bicabonates. VI. Salts of rubidium, caesium, and lithium, C. GERBER (*Compt. Rend. Soc. Biol.* [*Paris*], *70 (1911), No. 18, pp. 822–828; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 23, p. 945*).—Neutral ammonia salts in

small and medium amounts were found to stimulate the saccharification of starch, while large amounts checked it. Carbonates and bicarbonates were found to stimulate, while neutral carbonates behaved in the same manner as the alkaline salts. Rubidium chlorid and caesium chlorid act slightly stimulating when small amounts are used, but are indifferent with medium amounts, and have a retarding action with larger doses. Lithium chlorid has a retarding effect in all amounts.

Enzyms which decompose hexotrioses and stachyose, H. BIERRY (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 13, pp. 904–906; abs. in Chem. Ztg., 35* (*1911*), *No. 50, p. 452*).—The decomposition of hexotrioses is 2-phased, while stachyose is 3-phased, 2 and 3 enzyms taking part, respectively. The higher animals can not utilize polyoses, or at best do so only partly, while the invertebrates digest them completely.

In regard to reducing ferments; the Schardinger enzym (perhydridase), A. BACH (*Biochem. Ztschr., 31* (*1911*), *No. 5–6, pp. 443–449; abs. in Centbl. Bakt.* [*etc.*], *2. Abt., 30* (*1911*), *No. 19–20, pp. 494, 495*).—Schardinger's reaction is based on the cleavage of water by an oxydizable substance, through the agency of a catalyzer which forms with the hydrogen of water a labile, strongly reducing combination.

The studies of the author have particularly to do with the relation of Schardinger's enzym to the reductases present in tissues. The results show that the reductase of the liver and other organs is not a single enzym, and that one part of it seems to simulate the Schardinger enzym and the other part one which can be replaced by aldehydes. An analogy between oxidase and reductase seems to exist, according to the author, who states that oxidase is to be considered a system of peroxydase—peroxid-producing bodies—while reductase is a system of water-cleaving bodies.

The preparation and properties of an oxidase occurring in fruits, H. P. BASSETT and F. THOMPSON (*Jour. Amer. Chem. Soc., 33* (*1911*), *No. 3, pp. 416–423*).—There is present, according to these authors, an oxidase in fruits (ripe apples, green apples, pears, and walnut hulls) which is capable of producing a tannin-like substance in a slightly acid solution, and which in turn precipitates protein nitrogen. This tannin-like substance (or substances) was not found to exist in normal fruits, but only in those fruits which were removed from the tree or were injured. It is believed by the authors to have fungicidal properties. In part, it exerts its activity by acting directly upon the fungus and partly by the production of insoluble proteins.

Indications in regard to the presence of a catalase (precipitable by calcium carbonate) were also present.

The relation between tannin and another colloid in ripening fruits, particularly Phœnx, Achras, and Diospyros, F. E. LLOYD (*Ztschr. Chem. u. Indus. Kolloide, 9* (*1911*), *No. 2, pp. 65–73*).—In the tannin vacuole of the tannin dioplastids of all fruits, according to this author, there exists a body which consists of 2 substances, viz, tannin and another colloid. The structure of the tannin combination is dependent upon the second colloid. The second colloid, which, according to the author, is a carbohydrate resembling pectose jelly, is present in a slimy condition in unripe fruits, but later becomes hard and stiff, being converted into a gelatin-like substance when the ripening process is complete. It gives the usual tannin reaction.

Action of heat upon emulsin, G. BERTRAND and A. COMPTON (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 22, pp. 1518–1521, figs. 3; abs. in Wchnschr. Brau., 28* (*1911*), *No. 30, p. 336*).—Emulsin, according to these authors, is a mixture of 2 enzyms, viz, amygdalase, which only cleaves amygdalin into glu-

cose and almond trinitril glucosid, and amygdalinase, which further splits the almond trinitril glucosid into benzaldehyde, glucose, and hydrocyanic acid.

Note on Kjeldahl's process, V. EDWARDS and D. CHADS (*Chem. News, 103 (1911), No. 2678, p. 138; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 7, p. 451*).—If granulated tin is used instead of granulated zinc to prevent bumping, very little frothing is produced.

New method of determining nitrites, E. RUPP and F. LEHMANN (*Arch. Pharm., 249 (1911), No. 3, pp. 214–217; abs. in Pharm. Jour. [London], 4. ser., 32 (1911), No. 2485, p. 741; Merck's Rpt., 20 (1911), No. 8, p. 232*).—The method proposed rests on the fact that nitrous acid is oxidized quantitatively by bromin to nitric acid.

The estimation of small quantities of manganese, especially in the ash of plants or of animal organs, G. BERTRAND (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 8, pp. 361–370; Ann. Chim. Analyt., 16 (1911), No. 8, pp. 285–294; abs. in Analyst, 36 (1911). No. 424, pp. 369, 370*).—The material under examination is incinerated at a dull red heat until all the carbon is apparently burned off. The ash after cooling is moistened with hydrochloric acid and placed on a water bath. A little sulphuric acid is added, the mixture evaporated to dryness, and the contents of the dish again heated at a red heat. The manganese is then estimated in the ash by the persulphate method (colorimetrically), in the presence of silver nitrate as follows:

"Dissolve the plant ashes in 10 cc. of nitric acid (specific gravity 1.08), add 5 drops of a 10 per cent solution of silver nitrate, and at least 0.1 gm. of potassium persulphate. . . . The mixture is heated gently until the pink color shows no further increase in intensity. The temperature is then raised to boiling to destroy the excess of persulphate, and maintained at the boiling temperature until oxygen ceases to be evolved. The cooled liquid is made up to exactly 10 cc., and its color matched by that of a standard solution of manganese sulphate which has been oxidized in a similar manner."

A modified procedure for the detection of silicates, fluorids, and fluosilicates, P. E. BROWNING (*Amer. Jour. Sci., 4. ser., 32 (1911), No. 190, pp. 249, 250*).—As the usual methods for detecting silica and fluorin often yield unsatisfactory results in the hands of inexperienced persons, the author sought to obtain methods which were more trustworthy. The following method is recommended:

"A small lead cup about 1 cm. in diameter and depth was made by running the melted metal into a mold, and a flat piece of lead with a small hole in the center was used as a cover. Into this cup a small amount of finely powdered calcium fluorid, generally about 0.1 gm., was placed together with the silicate, and the mixture covered with a few drops of concentrated sulphuric acid, added by means of a medicine dropper or fountain pen filler. Upon the upper side of the cover a piece of moistened black filter paper was placed and upon this a small moistened pad of ordinary filter paper was laid to keep the black paper moist during a heating of about 10 minutes upon a steam bath. At the conclusion of the heating a white deposit was found on the underside of the black paper over the opening in the cover, if silica was present in appreciable amount."

The converse of the above method can be employed for the detection of fluorids, but here it is not quite so delicate, although good results can be obtained if 1 mg. of fluorin is present.

The valuation of chemical fertilizers of the superphosphate industry, (*Ztschr. Öffentl. Chem., 17 (1911), No. 14, pp. 262–265*).—This includes the rules for sampling and the permissible limits of accuracy in analyses as to what constitutes a just demand for determining low-grade fertilizers, etc., as compiled by the Association of Commercial Analytical Chemists and the Fertilizer Manufacturers' Association of Germany.

The determination of dry substance in roots, H. G. SÖDERBAUM (*Meddel. Centralanst. Försöksv, Jordbruksområdet, 1911, No. 8, pp. 11; K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 6, pp. 460–468*).—In order to prove the contention of Bolin, who assumed that the method usually employed for preparing an average sample of beet pulp by grating is inaccurate in so far that a great deal of water is lost during the process, the author examined 12 samples of beets. That such a loss of water takes place was noted, but the amount was exceedingly small and need not be taken into consideration in analytical work.

Physico-chemical tests in bromatology, G. BONAMARTINI (*Ann. Falsif., 4 (1911), No. 32, pp. 305–320*).—In reviewing the numerous physico-chemical methods thus far proposed for detecting adulteration in foods, condiments, and beverages, the author points out the limits of the electrical conductivity method for the examination of vinegar and wine. Numerous analyses (physical and chemical) of wine and vinegar are presented.

Biological analysis of honey, E. MOREAU (*Ann. Falsif., 4 (1911), No. 29, pp. 145–148*).—If honey is heated continuously for 1 hour at from 75 to 80° C., the invertase which it contains is nearly destroyed. It is completely destroyed at 100°. The amylolytic power is diminished at a temperature of from 75 to 80° when maintained for 1 hour, and gives only a violet-blue coloration with iodin and the dissolution of the starch grains. If heated at from 45 to 50° for 15 minutes only a little maltose is produced. A temperature of 100° or above destroys the diastase. The methods employed for determining the inverting and diastatic capacity are given in detail, and are accompanied by the results of examining 25 honeys for inverting capacity and 12 for diastatic capacity.

See also a previous note (E. S. R., 25, p. 612).

The pinene test for lemon oil, E. J. PARRY (*Chem. and Drug., 78 (1911), No. 1618, pp. 159, 160; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 3, p. 154*).—Ten authentic samples of lemon oil were examined with particular regard to determining the value of Chace's pinene test (E. S. R., 22, p. 112), with the result that the test was found not to be a positive one for detecting the adulteration of lemon oils. "Moreover, if a sample of lemon oil is adulterated with oil of turpentine to such an extent that a copious amount of crystals of pinene nitrosochlorid is obtained in the test, such adulteration can be detected more readily and with greater certainty by the ordinary methods of analysis."

Estimation of formic acid in foods, H. FINCKE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 1–2, pp. 88–104*).—Continuing previous work (E. S. R., 25, p. 311) the author sought to apply the methods noted to the estimation of formic acid in vinegar. The following topics are considered in the article: Gravimetric determination of small amounts of formic acid, some further tests in regard to the volatility of formic acid in steam, the source of error in the mercury method, and the formic acid content of vinegar and vinegar essences.

Polarimetric estimation of sugar by the method of Jolles, B. BARDACH and S. SILBERSTEIN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 9, pp. 540–543; abs. in Analyst, 36 (1911), No. 424, p. 361*).—After pointing out a method by which discoloration can be avoided, thus allowing the use of a much more concentrated solution for polarization without previous treatment with lead acetate, etc., the author states as a result of his tests with solutions of dextrose that the method is an accurate one.

The unification of reducing sugar methods.—A correction, P. H. WALKER (*U. S. Dept. Agr., Bur. Chem. Circ. 82, pp. 6*).—This circular calls attention to certain errors detected by M. N. Straughn in the tables for lactose (E. S. R., 18, p. 1020) that were used for compiling the official tables contained in Bulle-

tin 107, revised, of the Bureau of Chemistry (E. S. R., 20, p. 512). The corrected table is here presented in detailed form.

Isolation of raffinose from beet sugar products, H. E. ZITKOWSKI (*Amer. Sugar Indus. and Beet Sugar Gaz., 13 (1911), No. 1, pp. 8–10, figs. 7; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 6, p. 379*).—The method employed for this consists of the preparation of a mixture of lead raffinosate and saccharate by boiling molasses with litharge, decomposing with carbon dioxid, and allowing the raffinose to crystallize out (fractional crystallization) from the solution. The molasses experimented with came from a Colorado refinery.

Examination of lactose and the by-products of lactose manufacture, A. BURR and F. M. BERBERICH (*Milchw. Zentbl., 7 (1911), No. 6, pp. 241–264*).—This presents the results of investigations of crude and refined milk sugar and the by-products of the milk sugar industry. The methods used are stated in detail, most being those well-known in the literature.

In order to simplify the calculation involved in converting cuprous oxid to metallic copper, the author has rearranged Wein's table by multiplying the copper figure by the factor 1.1223 (Cu_2O 143.6 ÷ Cu 127.6), so that the amount of lactose can be read off directly from the cuprous oxid produced. As the approximate amount of lactose can also be found by multiplying the copper found by 0.73, the author here also, in order to avoid the usual calculation, has calculated all the copper figures to cuprous oxid.

The enzyms present in cow's milk, A. GIFFHORN (*Untersuchungen über Enzyme in der Kuhmilch. Inaug. Diss., Univ. Bern, 1909, pp. 45, abs. in Milchw. Zentbl., 7 (1911), No. 5, pp. 236, 237*).—This is a study in regard to the presence of enzyms in market milk.

It was noted that fresh normal milk gave a reaction with a fresh active guaiac tincture, reduced methylene blue-formaldehyde solution in from 5 to 12 minutes, decomposed from 0.01 to 0.0251 gm. of soluble starch, and had a catalase figure of from 5 to 30 mm. Mixed milk which reduces the formaldehyde-methylene blue solution and which possesses a high catalase content but a normal diastatic power is considered by the author highly polluted. A mixed milk having a low diastatic power, a high catalytic power, and reducing formaldehyde-methylene blue within 5 minutes and methylene blue in 1 hour, is not considered fit for human consumption, and one which decomposes more than 0.025 gm. of starch, has a high catalytic power, reduces formaldehyde-methylene blue quickly but does not reduce methylene blue within 1 hour, is to be considered a milk of pathologic origin. Mixed milks which give no guaiac reaction, contained no diastase, decolorized both methylene blue solution and formaldehyde-methylene blue solution within 1 hour, and possessed a high catalytic power, were those which had been heated to a temperature of over 72° C., before heating contained large amounts of bacteria, and were allowed to stand long after heating. Mixed milks which yielded the guaiac reaction but did not decompose starch, according to the author, were heated for 30 minutes at from 65 to 72°.

The occurrence of tyrosin crystals in Roquefort cheese, A. W. DOX (*Jour. Amer. Chem. Soc., 33 (1911), No. 3, pp. 423–425*).—The author investigated the small white specks which are invariably observed in the cracks and crevices of Roquefort cheese and found them to be tyrosin and not the calcium soaps of fatty acids as is usually supposed.

Methods of sampling milk (*Bd. Agr. and Fisheries [London], Intel. Div., Ann. Rpt. Proc. 1910, pt. 1, pp. 66–73*).—The methods considered are the dipper, plunger, pouring, and tube methods.

The tube method was found to be ineffective, and the dipper method fails to insure a proper mixing in every case. The pouring method, that is, pouring the

milk out of a churn into another churn and back again 3 successive times, is a good one. The plunger method with proper mixing may give good results.

A new formula for the calculation of the per centum of added water in cow's milk, F. J. SLATAPER (*Bul. Tex. Bd. Health, 5 (1911), No. 9, pp. 17, 18*).—A refractometric method of determining added water is given, which according to the author is new. The refractometer reading is subtracted from 42.4 (the figure for whole milk). This equals the number of degrees the reading is lowered by the added water, and divided by 0.274 gives the percentage of added water.

The value of chemical constants for detecting watered milk, G. CORNALBA (*Riv. Sci. Latte, 1 (1911), Nos. 2, pp. 45–52; 3, pp. 65–77*).—Continuing previous work (E. S. R., 20, p. 419; 21, p. 614) the author again shows the value of determining the soluble substances of milk serum (6 parts or thereabouts per 100 of milk) for detecting the watering of milk. This is deemed better than either the refraction or cryoscopic test.

Detection of watered milk, LEDENT (*Bul. Soc. Chim. Belg., 25 (1911), No. 3, pp. 133, 134; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 7, p. 441*).—The Cornalba method (see above) yielded very satisfactory results for detecting watered milk.

The superficial tension of milk and milk adulteration, E. CARAPELLE and G. CHIMERA (*Rev. Hyg. et Med. Infant., 9 (1910), No. 2, pp. 167–178; abs. in Rev. Sci. [Paris], 49 (1911), I, No. 1, p. 20; Ann. Falsif., 4 (1911), No. 29, p. 160*).—According to these authors the superficial tension of milk (cow's, goat's, and ass's) is greater in milks in which the cream has been removed or where water has been added to the milk.

The electrical conductivity of milk, R. BINAGHI (*Biochem. Ztschr., 29 (1910), No. 1–3, pp. 60–79*).—Noted from another source (E. S. R., 25, p. 207).

The alcohol test and the acidity of milk, G. FENDLER and C. BORKEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 8, pp. 477–480; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 10, p. 643*).—This test, which has been proposed for ascertaining the freshness of milk, consists of mixing milk with twice its volume of alcohol (50 per cent by volume). It is claimed that if the milk is fresh it will not curdle, and, therefore, its acidity is not more than 8 Soxhlet degrees. When the acidity is higher, coagulation takes place.

As a result of examining many hundred samples of milk the authors declare that while the test may serve as a preliminary one no definite relation seems to exist between the acidity of milk and the results obtained with the alcohol test.

Determination of iron by the colorimetric method (cow's milk), H. LACHS and H. FRIEDENTHAL (*Biochem. Ztschr., 32 (1911), No. 2, pp. 130–136*).—This procedure is based on the fact that the blood-red coloration which is caused by the union of iron and sulphocyanogen is produced by the undissociated iron sulphocyanate (ferric sulphocyanid) and reaches its greatest intensity in the presence of an excess of sulphocyanogen at a definite hydrogen ion concentration. Iron sulphocyanate can be extracted from the solution with ether.

The procedure is as follows: Five cc. of cow's milk are dried and ashed in a deep platinum crucible. The ash is dissolved in 1 cc. of a 6 times normal hydrochloric acid standard solution and 1 cc. of water. To the solution is added 1 cc. of a concentrated solution of potassium sulphocyanate and the mixture shaken up with 1 cc. of ether. The mixture after separation is compared as regards color with standard solutions of iron sulphocyanate in ether.

With this method a milk sample was found to contain 1.3 mg. of iron per liter, and a comparative test with the same milk but with 500 cc. for ashing gave 1.4 mg. per liter. The test is affected by trichloracetic, sulpho-salicylic,

nitric, sulphuric, and phosphoric acids. Amyl alcohol may be substituted for the ether.

Estimating the bacterial content of milk, with particular reference to the catalase test, W. KUNTZE (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 1–3, pp. 1–53*).—When working with Koning's fermentation apparatus the results were not always satisfactory. The author, therefore, constructed a series of tubes on the plan of Lunge's nitrometer, and with which it was possible to work several samples of milk at the same time.

He distinguishes between 2 types of catalase, viz, primary catalase, which originates from the mammary gland (under normal and abnormal conditions), and secondary catalase, which is exotic. A milk which has a low catalase and acid figure at the outset and a low catalase figure after incubating for 2 hours is considered fresh. Catalase he considers not directly dependent upon the fat content of the milk, as the catalase content was not always the highest in the end milks. Koning's contention that milks obtained earlier than from 3 to 4 weeks after parturition should not be fed to infants is not supported by the author, who believes that 14 days is a sufficient length of time. He illustrates this by practical examples.

Determining the bacterial content of milk by the usual methods is not deemed an adequate criterion. The fermentation tests did not always yield entirely satisfactory results, and the author ascribes the favorable results obtained by the rennet test with milk having a low bacterial content to the fact that such samples usually come from healthy animals, the normal digestion processes in which have a favorable influence upon the bacterial flora of the milk. When the animals were given green feed during the summer months the rennet test was the least positive. The relation between *Bacillus aërogenes*, *B. coli*, and the true lactic-acid bacteria was found to vary very much during the summer and winter months, so that there can not be expected a low finding in winter with the fermentation test and a high one in summer. This would indicate that the racial characteristics of certain coli bacilli on green feed were responsible for their lesser occurrence in the test during the summer months.

Schaeffer's curd tester, GRIMMER (*Milchw. Zentbl., 7 (1911), No. 5, pp. 211–213*).—This method, which has been described in detail (E. S. R., 22, p. 212), was not found to be entirely satisfactory. Preference is therefore given to the usual ammonium sulphocyanate method for iron, which yielded more reliable results. For detecting iron in curd the method is as follows: A small amount of curd is mixed with from 2 to 3 cc. of water, and then 1 cc. of hydrochloric acid, and a few crystals of ammonium sulphocyanate are added. In the presence of iron a definite red coloration is produced.

Report in regard to the progress made in dairy chemistry and dairying during the second half of 1910, GRIMMER (*Milchw. Zentbl., 7 (1911), No. 2, pp. 49–70*).—Continuing previous summaries (E. S. R., 24, p. 612), the topics considered are the various kinds of milk, milk constituents, changes in milk and milk constituents, bacteria, enzyms, and antibodies, milk as a food, dairy products, dairy apparatus, methods for examining milk, and keeping of animals and milk products.

Report in regard to the progress made in dairy chemistry and dairying during the first half of 1911, GRIMMER (*Milchw. Zentbl., 7 (1911), No. 8, pp. 337–361*).—Data corresponding to the above are presented for the first half of 1911.

Methods for the analysis of sulphur intended for agricultural purposes (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 5, pp. 546–548*).—A description of the official French methods, with the definitions for various kinds of sulphur used in agriculture. The methods are for the determination of the

degree of fineness, moisture, ash, free sulphur, sulphur insoluble in carbon disulphid, and the microscopic examination of sulphur.

Modification of the sulphonation test for creosote, E. BATEMAN (*U. S. Dept. Agr., Forest Serv. Circ. 191, pp. 7, fig. 1*).—As the sulphonation test described in Forest Service Circular 112 (E. S. R., 19, p. 812) has been found to give unreliable results, the author has modified it as follows: "Ten cc. of the fraction of creosote to be tested are measured into a Babcock milk bottle. To this is added 40 cc. of 37 times normal acid, 10 cc. at a time. The bottle with its contents is shaken for 2 minutes after each addition of 10 cc. of acid. After all the acid has been added the bottle is kept at a constant temperature of from 98 to 100° C. for 1 hour, during which time it is shaken vigorously every 10 minutes. At the end of an hour the bottle is removed, cooled, and filled to the top of the graduations with ordinary sulphuric acid, and then whirled for 5 minutes in a Babcock separator. The unsulphonated residue is then read off from the graduations. The reading multiplied by 2 gives per cent by volume directly. (Each graduation equals one two-hundredths of a cubic centimeter.)

"In well-equipped chemical laboratories the usual steam-jacket ovens, capable of maintaining a temperature of from 98 to 100° C., will keep the reaction mixture of the sulphuric acid and creosote at the proper temperature."

A steam bath designed for laboratories confining themselves to the examination of creosote is described and illustrated.

Determination of nicotin in the presence of pyridin bases, L. SUBRE (*Ann. Falsif., 4 (1911), No. 32, pp. 331–334; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 15, p. 979; Chem. Ztg., 35 (1911), No. 82, p. 756*).—Nicotin has a high levorotation (—161° 55′ at 20° C. for the sodium flame), whereas pyridin is optically inactive and does not affect the nicotin reading, which in aqueous solutions of from 1 to 8 per cent is proportional to the concentration. The author has devised a method for determining nicotin in tobacco extracts which rests upon this principle.

Paper technology, R. W. SINDALL (*London, 1910, 2. ed., rev., pp. XV+269, pls. 13, figs. 158*).—An elementary manual on the manufacture, physical qualities, and chemical constituents of paper and of paper-making fibers.

Laboratory book for the potash industry, L. TIETJENS and H. ROEMER (*Laboratoriumsbuch für die Kaliindustrie. Halle, 1910, pp. VIII+76, figs. 8*).—This is chiefly a description of the methods in use in the potash industry. Its contents are as follows: Analytical aids; sampling; analysis and description of the salts of the German potash industry; analysis of the by-products; analysis of potash-saltpeter; analysis of various kinds of potash; and an appendix which contains a description of the methods for determining potash, the official methods employed in the German agricultural experiment stations, reducing methods, and the Neubauer method.

A bibliography is appended.

METEOROLOGY—WATER.

The obstacles to the progress of meteorology, C. ABBE (*Jour. Franklin Inst., 173 (1912), No. 1, pp. 55–71*).—Among the obstacles enumerated are faulty instruments and methods of observation, and the need of more extended observations and "of a laboratory building specifically adapted to atmospheric experiments and the association therewith of able students trained in mathematics, physics, and mechanics."

Meteorological observations (*Ann. Statis. Egypte, 3 (1911), pp. 11–22*).—Observations on temperature, atmospheric pressure, rainfall, and wind movement at various points in Egypt, covering various periods from 1871 to 1910, are summarized in detail.

Meteorological investigations on the summer floods of the Oder, G. HELLMANN and G. v. ELSNER (*Veröffentl. K. Preuss. Met. Inst., 1911, No. 230, pp. XI+235, pls. 55; rev. in Naturw. Rundschau, 26 (1911), No. 48, pp. 609–611; Met. Ztschr., 29 (1912), No. 1, pp. 10–18*).—The essential feature of this report is a series of charts correlating atmospheric pressure, temperature, precipitation, and summer floods in the Oder drainage basin. These show, as was to be expected, that the precipitation is the controlling factor in these floods, but it was found that there is not complete parallelism between precipitation and high water. Atmospheric pressure is shown to be an important factor in determining the flood conditions. No attempt is made, however, to draw general conclusions as to the agencies which cause and control the floods.

Surface water supply of California, 1909, W. B. CLAPP and F. F. HENSHAW (*U. S. Geol. Survey, Water-Supply Paper 271, pp. 256, pls. 6, fig. 1*).—This is one of the series of papers reporting results of stream flow measurements in the United States. It gives in detail the results of measurements in the Lower Colorado River, Great Basin, South Pacific Ocean, San Francisco Bay, and North Pacific Ocean drainage basins.

Water resources of Antelope Valley, California, H. R. JOHNSON (*U. S. Geol. Survey, Water-Supply Paper 278, pp. 92, pls. 7, figs. 11*).—This paper describes this valley, which lies in the southwestern part of the Mohave Desert, and reports the results of measurements of its surface and underground waters.

The underground waters of the Oasis of Kharga, H. J. L. BEADNELL (*Cairo Sci. Jour., 5 (1911), No. 52, pp. 1–8*).—This is a reply to a discussion and criticisms by G. W. Grabham (E. S. R., 24, p. 216) of the author's explanation of phenomena of the flowing wells of the Oasis of Kharga.

The waters of Kharga, G. W. GRABHAM (*Cairo Sci. Jour., 5 (1911), No. 61, pp. 246–261, figs. 8*).—This is a reply to Beadnell's paper noted above.

The nonnitrification of sewage in sea water, J. E. PURVIS, A. C. N. MCHATTIE, and R. H. J. FISHER (*Jour. Roy. Sanit. Inst., 32 (1911), No. 9, pp. 442–448; abs. in Proc. Cambridge Phil. Soc., 16 (1911), No. 4, p. 391*).—Investigations are reported which showed that even when special precautions were taken to secure an abundant supply of oxygen in the culture solution there was no nitrification of sewage when mixed with sea water.

The Berlin sewage farms, H. A. ROECHLING (*Surveyor, 40 (1911), Nos. 1035, pp. 577, 583–587; 1036, pp. 617, 618*).—This article, based upon the report on these farms for the year ended March 31, 1910, describes the management of the farms and the results which have been obtained through a series of years.

The farms cover an area of 43,000 acres and successfully dispose of 64,000,000 gal., or 30 gal. per capita, of sewage in 24 hours. The farms are utilized for the production of various crops, live stock, and fish. During the last 26 years there have been only 5 years in which there was a financial deficit, the balance of profit for the whole period being $884,000. Among the more important crops grown are rye, wheat, barley, oats, corn, potatoes, beets, carrots, and rye grass besides various fruits and vegetables. A considerable number of beef cattle, pigs, and sheep are raised, and dairying furnishes one of the chief sources of revenue. An aggregate area of 48 acres is in fishponds filled with effluent from the land, yielding an average profit of $16 per acre in fish products.

Frequent examinations of the effluent from these farms showed that the purification was satisfactory although the sewage was applied to the land at the rate of about 1 acre per 100 persons. Of 95 wells on the farms only 7 were found to contain *Bacillus coli*.

Systematic experimental work is carried on on the farms in the study especially of the adaptability of various plants to sewage irrigation, the quality of crops grown with sewage and their improvement, the water supply and the

methods of application best suited to the crops, the value of artificial fertilizers as a supplement to sewage, methods and implements of culture especially adapted to sewage farming, and the fertilizing value of sludge and sludge ash.

It has been found among other things that corn, alfalfa, and forage plants are especially adapted to sewage farming; that oats and rye grown with sewage have a high value as forage, but that the rye is not well suited to brewing; that commercial fertilizers are not as a rule profitable as a supplement to the sewage, although the use of lime improves the physical condition of the soil and accelerates nitrification; that heavy applications of sludge in pot experiments did no great injury to the plants; and that sludge ash did not show any great fertilizing value.

"The investigations into the purification of sewage by double irrigation and fishponds have demonstrated the undoubted value of these 2 methods, which bring about at the same time a further utilization of the foodstuffs still left in the effluent, and an important economic use of the water."

The success of these farms is ascribed mainly to good management but also to the facts that large areas of suitable light land with good drainage are available and storm waters are not handled.

SOILS—FERTILIZERS.

Philippine soils and some of the factors which influence them, A. J. Cox (*Philippine Jour. Sci., A. Chem. and Geol. Sci., 6 (1911), No. 4, pp. 279–330, pls. 11, figs. 10*).—The results of mechanical and chemical analyses of a large number of samples of soil from different parts of the Philippine Islands are reported.

The analyses indicated a high state of fertility of the soils, excluding certain samples of soils of known low fertility. Physical determinations indicated that disintegration of the floccules was not accomplished by passing the soil under water through a sieve (Schöne method), but that it was satisfactorily accomplished "by shaking the samples for 6 hours in 250 cc. bottles together with about 75 cc. of distilled water to which 10 drops of ammonia had been added." Drying the soil at 110° C. modified its mechanical composition, there being a tendency to form hard aggregates which did not disintegrate. This tendency was greatest for soils containing the highest percentages of clay.

The article includes a compilation of climatological data and statistics of crop production for the islands. It is shown that there are two definite and distinct types of rainfall in the Philippines, the western half of the archipelago having a fairly well defined wet and dry season, and the eastern half a rainfall quite equitably distributed throughout the year.

The soils of Poland, T. von Trzcinski (*Ernähr. Pflanze, 7 (1911), No. 23, pp. 262–264*).—This article is based on the work of S. Miklaszewski, and discusses the physical and chemical composition and agricultural value of representative soil types of Russian Poland.

Some typical Auckland soils, B. C. Aston (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 4, pp. 304–310*).—The results of mechanical and chemical analyses of samples of 7 different soil types of the region are reported, together with a brief discussion under each type as to methods of improving the soil.

Alkali soils from the knee of the Niger River, A. Hébert (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 16–17, pp. 842, 843; abs. in Chem. Zentbl., 1911, II, No. 17, p. 1369*).—Analysis of a sample of alkali soil from this region showed chlorin 4.05, sulphuric acid 5.26, silicic acid 71, lime 2.24, magnesia 2.5, soda 7.98, total nitrogen 0.042, and nitric acid 0.007 per cent, and traces of potash and carbon dioxid. No phosphoric acid was found. The soil is impregnated

with sodium chlorid and sulphate, the former being present to some extent in the form of crystals of pure salt which can be easily separated from the soil.

The poverty of this sample in potash and phosphoric acid accords with results of previous analyses of African soils, which show that the soils are as a rule very poor in these constituents. The importance of the results as indicating a source of supply of salt, which is generally scarce in Africa, is also noted.

The absorptive capacity of some Palatinate soils for different plant nutrients, O. Engels (*Landw. Jahrb. Bayern, 1 (1911), No. 9, pp. 689–706*).—Measurements were made of the absorptive powers of 5 soil types of the region for solutions of superphosphate, potassium sulphate, ammonium sulphate, and sodium nitrate during 4 hour, 1, 8, and 14 day periods. The author used per 100 gm. of the soil 200 cc. of the potassium sulphate and ammonium sulphate solutions, containing respectively 0.5416 gm. potash and 0.408 gm. nitrogen. The proportions of superphosphate and sodium nitrate used are not stated.

The results of these studies show that there was practically no further absorption of potash and ammonia after 4 hours. Absorption of these substances, as well as of phosphoric acid, increased with the lime, iron, and alumina contents of the soil. There was no absorption with the sodium nitrate solution. The absorption of phosphoric acid increased with the lapse of time, there being in some cases an absorption for 14-day periods of 3 times that for the 4-hour periods. After 4 weeks there was practically no increase in absorption of phosphoric acid except a small increase in case of a soil rich in lime.

Investigations on the nitrogen economy of the soil, W. Schneidewind, D. Meyer, and F. Münter (*Fühling's Landw. Ztg., 60 (1911), No. 22, pp. 780–791*).—Determinations were made of the relative amounts of nitrogen in fallow and in cropped soil plats for a period of 3 years, together with tests of the influence of added straw, peat, and sugar on the assimilation of nitrogen by the plants. The crops grown were turnips, oats, and potatoes during 1909, 1910, and 1911, respectively.

The results of the study show that in the fallow plats there was considerable loss of nitrogen (85.5 lbs. per acre), mostly as nitrates in the drainage water but probably also in the form of ammonia and free nitrogen. The loss in nitrogen was less in the cropped than in the fallow soil plats notwithstanding the large amounts of nitrogen taken up by the plants. Including the nitrogen assimilated by the plants, there was an average yearly gain in nitrogen of 29.5 lbs. per acre for the cropped plats. Straw and sugar, even when applied in the fall, somewhat reduced nitrogen assimilation by the plants, but the total nitrogen content of the straw and sugar soil plats did not vary from that of the unfertilized plats and from those fertilized with peat.

Formation of nitrates in cultivated soil, A. Koch (*Jour. Landw., 59 (1911), No. 3, pp. 293–315; abs. in Chem. Zentbl., 1911, II, No. 15, p. 1170*).—Determinations of nitrates from time to time at different depths down to 80 cm. in soils protected from leaching showed a slow but steady increase in nitrates, which, however, was greater the first year than later. Improving aeration by adding sand or loam increased the formation of nitrates. The nitrate content and the nitrifying power declined with the depth, the former more rapidly than the total nitrogen.

In pot experiments in which ammonium sulphate was applied at the rate of 2 gm. per kilogram of soil, it was found that about one-half of the sulphate applied in November was nitrified by the following March, thus showing quite active nitrification during the winter months. There was, however, a considerable loss of the nitrogen of the sulphate in the process of oxidation to nitrates, amounting in one case to 29 per cent. In soils to which ammonium sulphate

had been added somewhat less nitrate was formed in the subsoils than in the surface soils during the first 3 months but later there was less difference in this respect.

There was a decided loss of nitrogen due to escape of ammonia when caustic lime was added to soil containing ammonium sulphate. A smaller loss resulted when calcium carbonate was added. The addition of caustic lime checked nitrification of ammonium sulphate to a marked extent, but in unfertilized soil increased the formation of nitrate from the soil nitrogen as long as it remained in caustic form.

Investigations on the behavior of ammoniacal nitrogen in limed and unlimed soil, O. LEMMERMANN ET AL. (*Landw. Jahrb., 41 (1911), No. 2, pp. 163–216; abs. in Chem. Zentbl., 1911, II, No. 25, pp. 1879, 1880*).—The investigations here reported consisted of a series of pot experiments with different kinds of soil and varying amounts of lime (calcium carbonate), ammonium sulphate, and a mixture of ammonium sulphate and superphosphate, to determine the transformations and loss of the ammoniacal nitrogen under the varying conditions.

With the additon of 1 per cent of calcium carbonate to a sandy soil there was a loss of soil nitrogen, due perhaps to the fact that the ammonium sulphate was applied very soon after liming. When 0.6 per cent of calcium carbonate and 10 mg. of ammoniacal nitrogen per 100 gm. of soil were applied the loss was slight. On the limed soil, the ammoniacal nitrogen applied was transformed to large extent to nitrate and albuminoid nitrogen in the course of 42 days, although there was still some ammoniacal nitrogen in the soil at the end of that time. The loss of nitrogen with heavy applications of calcium carbonate (1 per cent) and ammoniacal nitrogen (39.6 mg. per 100 gm. of soil) decreased with the clay and claylike constituents and with the water capacity of the soil. There was no loss of nitrogen when 10 mg. of ammoniacal nitrogen per hundred grams of soil was applied to soils containing respectively 5 and 15.5 per cent of silt and clay and 95 and 84.5 per cent of sand 5 weeks after liming with 0.6 per cent of calcium carbonate, but when these applications were doubled, there was a loss of nitrogen. When superphosphate was used in connection with ammonium sulphate, there was very little loss of nitrogen even with the heaviest applications. Deep mixing of the ammonium sulphate with the soil reduced the loss of nitrogen.

In light soils containing 0.6 per cent of calcium carbonate, the ammonium sulphate was largely nitrified. In heavy soils it was more largely converted into organic nitrogenous compounds. In an unfertilized sandy loam soil there was little change in total, ammoniacal, nitrate, and organic nitrogen during 77 days. There was no loss of nitrogen when heavy applications of ammonium sulphate were made to an unlimed soil having a natural lime content of 0.14 per cent. An increased lime content was not always accompanied by an increased loss of nitrogen, provided the absorptive power and conditions for formation of organic nitrogenous compounds and nitrification were sufficiently favorable.

The general conclusion from these investigations is that there is little danger of loss of nitrogen under the ordinary methods of liming and applying ammonium sulphate, provided the ammonium sulphate is thoroughly incorporated with the soil and does not follow liming too closely.

The chemical nature of the organic nitrogen in the soil, S. L. JODIDI (*Jour. Amer. Chem. Soc., 34 (1912), No. 1, pp. 94–99*).—In continuation of earlier work (E. S. R., 25, p. 622), the author investigated additional plats of Wisconsin drift soil with reference to the nature of the organic nitrogen contained in them. The results agree with his earlier conclusion that the principal portion

of the acid soluble nitrogen in the soil studied was made up of acid amids, monoamino, and diamino acids.

In order to ascertain the proportion of diamino and monoamino acids the soil extracts were examined as follows: "The soil extract containing amino acids, upon examination of the optical activity, is made up to a definite volume, say, to 60 cc., for which the nitrogen in 15 cc. is determined by the Kjeldahl method to ascertain the total nitrogen present in the sample, 15 cc. are titrated in the ordinary way to determine the acidity of the substance, and 2 portions of 15 cc. each are titrated with formaldehyde to find the increase of acidity due to the reaction with formaldehyde. These 3 operations furnish all the data which are necessary for the calculation of the percentage of diamino or monoamino acids present in the substance under examination."

The results of this study showed that the larger part of the phosphotungstic acid precipitate represented diamino nitrogen, the smaller part belonging to classes other than diamino acids. In the case of the filtrate from the phosphotungstic acid precipitate "it was found that from 68.02 to 85.98 per cent of that filtrate represent in fact monoamino nitrogen, the rest (from 31.98 to 14.02 per cent) consisting of nitrogenous compounds other than monoamino acids."

The "availability" of phosphoric acid in the soil, H. J. Vipond (*Agr. Jour. Union So. Africa, 2 (1911), No. 5, pp. 602–611*).—The author attempts to classify Transvaal soils on the basis of a comparison of "the ratio of 'total' to 'available' phosphoric acid with the ratio of the iron oxid and alumina to the lime and one-half of the magnesia."

This method applied to about 250 samples of soils indicated a decrease in availability of phosphoric acid with an increase of the ratio of iron oxid and alumina to lime and half the magnesia up to 1:40, but practically none beyond. Of the soils examined 22.8 per cent showed an "iron-lime" ratio of less than 1:30.

The general conclusion reached was "that a fair amount of lime in the soil insures a fair availability of the phosphoric acid. On the other hand, many soils with a poor ratio of lime to iron oxid show a high ratio of availability of the phosphoric acid. Soils rich in humus almost invariably contain a good deal of available phosphoric acid whether rich in lime or not—there is no doubt, therefore, that the phosphates of the humus are dissolved to a considerable extent by 1 per cent citric acid. Sandy soils, which usually contain low percentages of iron oxid, alumina, lime, and phosphoric acid, with nevertheless a high ratio of iron to lime, show as a rule a better ratio of availability of phosphoric acid. This does not mean that the actual amount of available phosphoric acid is greater in the sandy soils."

Influence of the acid content of green plants on the utilization of insoluble phosphates, G. Corso (*Staz. Sper. Agr. Ital., 44 (1911), No. 5–6, pp. 309–316; abs. in Chem. Zentbl., 1911, II, No. 12, pp. 895, 896*).—From pot experiments with plants of different botanical families on soils containing a high percentage of insoluble phosphoric acid, the author concludes that the solvent power of plants for citrate-insoluble phosphoric acid varies with different families of plants. The higher the acid content of the plants the greater the utilization of the insoluble phosphoric acid.

Investigations on the decomposition of the carbon compounds of different organic substances in the soil, especially under the influence of lime, O. Lemmermann et al. (*Landw. Jahrb., 41 (1911), No. 2, pp. 217–256; abs. in Chem. Zentbl., 1911, II, No. 25, pp. 1880, 1881*).—The decomposition of the organic compounds in soils was studied by examinations of the air drawn through glass

flasks, each of which contained 1 kg. of sandy loam with various additions of manure, green manure, caustic lime, and calcium carbonate.

It was found that both caustic lime and calcium carbonate increased the rate of decomposition of organic substances in the soil. The use of kainit and superphosphate in addition to the lime compounds reduced the decomposition. Under the conditions of these experiments the depth to which the organic substances were buried in the soil had no appreciable influence upon the extent of decomposition. The decomposition of the organic matter of green manure was greater than that of stable manure, and the decomposition of manure lying on the surface of the soil was as large as of that incorporated with the soil. The decomposition of the organic compounds was not increased by mixing green manure and stable manure.

Lime compounds in different kinds of soil, S. S. ELENEVSKI (*Izv. Moskov. Selsk. Khoz. Inst.* (*Ann. Inst. Agron. Moscou*), *17* (*1911*), *No. 2, pp. 320–332*).—The results of determinations of total lime, calcium carbonate, lime in absorbed condition, and lime in hydrochloric acid extract, before and after ignition, in 3 different kinds of soil (black soil, loam, and podzol) are reported.

Bacteriological tests in soil and dung, W. A. MILLARD (*Centbl. Bakt.* [*etc.*], *2. Abt., 31* (*1911*), *No. 16–22, pp. 502–507*).—Addition of sterilized soil in the Löhnis dilution method stimulated the multiplication of various groups of soil organisms, especially the nitrogen assimilating organisms. Experiments with various mixtures of manure and straw indicated that nitrifying organisms were not present to an appreciable extent.

Toxic effects of "alkali salts" in soils on soil bacteria.—I, Ammonification, C. B. LIPMAN (*Centbl. Bakt.* [*etc.*], *2 Abt., 32* (*1911*), *No. 1–2, pp. 58–64; abs. in Jour. Chem. Soc.* [*London*], *102* (*1912*), *No. 591, II, p. 76*).—The author tested the effect of sodium chlorid, sodium sulphate, and sodium carbonate, in amounts varying from 0.2 to 2 per cent, on ammonification in soil containing 2 per cent of dried blood.

From the results of these studies he concludes that "ammonification in soils is inhibited by the presence of various amounts of each of the 'alkali salts' NaCl, Na_2SO_4, Na_2CO_3. The first is the most toxic, the second much less so, the last only slightly toxic except at very high concentrations. The actual points at which these salts become markedly toxic toward ammonification in soils are between 0.1 per cent and 0.2 per cent for NaCl, 0.4 per cent for Na_2SO_4, and 2 per cent for Na_2CO_3. These salt effects are very different from those noted on plants by the alkali salts mentioned. In fact the conditions are about reversed. These facts will have an important bearing in the consideration of plans for reclaiming alkali land."

On the behavior of leguminous plants toward inoculating material from different sources, A. G. DOIARENKO (*Izv. Moskov. Selsk. Khoz. Inst.* (*Ann. Inst. Agron. Moscou*), *17* (*1911*), *No. 2, pp. 241–246, 254, figs. 2*).—As in previous experiments, inoculation with soil extract and with infusions of fresh nodules gave better results than the use of commercial preparations. Of the latter, nitragin gave relatively better results than the preparations of Moore and Bottomley.

Soil sterilization, R. EMMERICH, WILHELM GRAF ZU LEININGEN, and O. LOEW (*Centbl. Bakt.* [*etc.*], *2. Abt., 31* (*1911*), *No. 16–22, pp. 466–477; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 3* (*1912*), *No. 1, pp. 67–69*).—In continuation of previous investigations (E. S. R., 25, p. 435) tests were made of various sterilizing agents—chlorid of lime, potassium permanganate, tricresol, carbon bisulphid, and carbolineum—as remedies for soil sickness. As Hiltner had already shown, carbolineum was found to be a very efficient sterilizing agent when used at the rate of from 50 to 150 cc.

per square meter. Chlorid of lime was often effective, but not unless used at rates of 300 gm. or more per square meter.

The daily course of atmospheric pressure in the soil, R. Börnstein (*Verhandl. Deut. Phys. Gesell., 13 (1911), No. 14, pp. 511, 512; Phys. Ztschr., 12 (1911), No. 18, pp. 771–776, figs. 4; Met. Ztschr., 28 (1911), No. 12, pp. 561–566, figs. 4; abs. in Beibl. Ann. Phys., 35 (1911), No. 22, pp. 1230, 1231; Prometheus, 22 (1911), No. 1143, Sup., p. 201, fig. 1*).—The atmospheric pressure in the soil at a depth of 1 meter was observed during 6 months (February to July, inclusive) of 1911 by means of a special form of barograph. A comparison of these observations with observations made in the free air showed a parallelism between variations in the soil and the air with this exception, that the daily forenoon variations were greater and the afternoon variations were smaller in the soil than in the air.

An effective method of preventing the erosion of hill lands, W. B. Mercier (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 706, pp. 7, figs. 5*).—The author gives directions for laying out a system of broad terraces—a combination of the hillside ditch and the true terrace—for the control of water on hill lands. It is believed that this system is of particular value in the cotton-growing States where large areas "are badly in need of some method of preventing the land from washing away."

The agricultural side of peat bog utilization, C. A. Davis (*Jour. Amer. Peat Soc., 4 (1911), No. 2, pp. 97–100*).—The status of swamp reclamation for agricultural purposes in the United States and Europe is briefly discussed and attention is called particularly to the possibility of utilizing drained peat beds for the production of farm power.

Results of cooperative experiments with fertilizers on swamp soils, R. Harcourt (*Ann. Rpt. Ontario Agr. and Expt. Union, 32 (1910), pp. 44, 45*).—Cooperative experiments which showed especially the need of potash are briefly reported.

Stable manure as a source of nitrogen, phosphoric acid, and potash, A. G. Doĭarenko (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron, Moscou), 17 (1911), No. 2, pp. 266–275, figs. 3*).—The results of pot experiments with stable manure from different sources showed that the manure was poorly utilized as a source of nitrogen. The phosphoric acid was more assimilable, and the potash was the most readily available of the 3 constituents. Pigeon manure contained nitrogen and phosphoric acid in very available form.

[Fertilizing value of peat], A. R. Whitson (*Campbell's Sci. Farmer, 4 (1911), No. 12, pp. 11, 12*).—In experiments on very poor sandy soil at Sparta, Wis., 25 loads of peat per acre combined with a basal fertilizer of potash and phosphoric acid gave better results during 2 years than 15 loads per acre of manure, indicating that peat can be used to advantage on such soils.

The fertilizing value of certain nitrogenous substances, A. Grégoire and J. Hendrick (*Ann. Gembloux, 21 (1911), No. 12, pp. 595–605; abs. in Engrais, 26 (1911), No. 50, pp. 1385–1387*).—Pot experiments on sandy soil with Prussian blue, residue from the manufacture of potassium ferrocyanid, crude ammonia, calcium cyanamid, ground raw and roasted leather, wool, and ammonium sulphate, showed that with timothy the nitrogen of the pure wool used was 87 per cent as effective during the first year as that of ammonium sulphate, that of crude ammonia 36 per cent as effective, and that of calcium cyanamid 73 per cent as effective. Prussian blue was not only without effect as a fertilizer but injured the plants slightly. The residue from manufacture of potassium ferrocyanid was practically of no fertilizing value. Raw ground leather was of no fertilizing value, but the nitrogen of the ground roasted leather was 20 per cent as effective during the first year as that of ammonium sulphate.

Tests with four nitrogenous manures (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 2, pp. 315–317*).—Tables present in detail the yields obtained during 1909 and 1910 after applications of sulphate of ammonia, nitrate of soda, nitrate of lime, and calcium cyanamid to oats, potatoes, turnips, and mangels.

The results "indicate that the 2 new nitrogenous manures are not inferior to the 2 manures which are already in general use." Attention is called, however, to the tendency of the nitrate of lime to absorb moisture and thus become difficult to handle, and to the difficulty of applying the calcium cyanamid on account of its fine powdery condition.

The production of sulphate of ammonia, C. A. DAVIS (*Jour. Amer. Peat Soc., 4 (1911), No. 2, pp. 84, 85*).—It is shown in this article that, following the removal of the tariff, imports of ammonium sulphate into the United States have rapidly increased. It is stated that the imports from all countries in 1908 amounted to 76,475,104 lbs. worth $1,982,830, and in 1910 to 184,686,534 lbs. worth $4,668,820.

The importance of fine grinding of lime marl and of mixing calcium carbonate and caustic lime, BREHMER (*Illus. Landw. Ztg., 31 (1911), No. 89, p. 832, fig. 1*).—Comparative tests were made of very finely ground marl and of marl of ordinary fineness in pot experiments with a variety of crops.

The results showed that the action of the marl was increased to a considerable extent by fine grinding. Much better results, however, were obtained by mixing ground caustic lime with calcium carbonate.

Fertilizers from the ocean, M. LUNDIE and R. W. HALLACK (*So. African Jour. Sci., 7 (1911), No. 5, pp. 183–188*).—The use of sea plants as fertilizer is discussed, and analyses of samples of seaweeds, which are found in large quantities on the coast of South Africa, are reported as follows:

Analyses of fresh samples of South African seaweed.

Kind of seaweed.	Water.	Nitrogen.	Ash.
	Per cent.	*Per cent.*	*Per cent.*
Sea grass (*Entoromorpha intestinalis*)	77.44	0.567	4.80
Algæ (*Ulva lactuca*)	78.04	.350	3.16
Fucus (*Fucus palmatus*)	86.42	.071	4.87

In the ash of these plants the phosphoric acid varied from 3.87 per cent in Fucus to 9.98 per cent in Algæ, the potash from 9.5 per cent in Algæ to 44.31 per cent in Fucus, and the lime from 7.16 per cent in Fucus to 28.96 per cent in Algæ.

It is stated that these seaweeds are not at present used for agricultural purposes in South Africa.

[Fertilizer from salmon cannery waste], J. N. COBB (*U. S. Dept. Com. and Labor, Bur. Fisheries Doc. 751, pp. 66, 67*).—It is stated that "the most serious evil in the salmon industry to-day is the enormous wastage which annually occurs. About one-fourth of the total weight of each fish handled at the various packing plants is thrown away." This waste could be largely prevented and the by-products profitably utilized if a small odorless-fertilizer plant, costing not more than $2,500 to $3,000, were available for installation in connection with the canneries and salteries. Plants established at Astoria, Oreg., and Killisnoo, Alaska, for the extraction of oil and manufacture of fertilizer are referred to.

Fertilizers and Paris green, J. E. HALLIGAN ET AL. (*Louisiana Stas. Fert. Rpt. 1910–11, pp. 101*).—This is a report of official inspection of fertilizers and Paris green in Louisiana during the year 1910–11, including analyses and

valuations of over 7,000 samples of mixed fertilizers and fertilizing materials, among the latter being bone meal, tankage, cotton-seed meal, and fertilizer chemicals. The analyses show a tendency for the complete fertilizers to be deficient in nitrogen, but to exceed the guaranty in potash.

In the case of cotton-seed meal, of which 1,023 samples were examined, 716 samples were equal to or above the guaranty, the average nitrogen found in all samples being 6.66 per cent as compared with 6.52 per cent guarantied.

"The 106 Paris green samples received varied from 49.59 per cent to 59.25 per cent of arsenious oxid; they averaged 55.87 per cent of arsenious oxid. Only 1 sample fell below the guaranty of 50 per cent arsenious oxid, the requirement of [the State] law."

Analyses of commercial fertilizers (*New York State Sta. Bul. 341, pp. 297–397*).—This bulletin reports analyses of samples of fertilizers collected during 1911, the actual analyses being compared with the guarantied composition in each case. A schedule of current values of fertilizing ingredients is given and the method of calculating the value of fertilizers is explained.

Fertilizer analyses, A. J. Patten, O. B. Winter, and C. G. Clippert (*Michigan Sta. Bul. 265, pp. 43*).—Analyses and valuations of 230 brands of fertilizers offered for sale in Michigan during the season of 1911 are reported.

AGRICULTURAL BOTANY.

Breeding and the Mendelian discovery, A. D. Darbishire (*London and New York, 1911, pp. XII+282, pls. 34, fig. 1*).—This book is intended as an introduction to the discoveries of Mendel and their application to the science of heredity and the practice of breeding. The author has given a somewhat fuller account of some of the phenomena observed by Mendel than has previously been published, and the different pairs of characters studied by Mendel are figured and described. Some of the more important lessons that the practical breeder can learn from a study of Mendelism are pointed out, and the more interesting biological questions are discussed. A glossary is given in which the more technical terms used in breeding are defined.

Perfect flowers in maize, E. G. Montgomery (*Pop. Sci. Mo., 79 (1911), No. 4, pp. 346–349, figs. 6*).—The author describes a type of corn in which perfect flowers were found. Some 30 plants were grown and all came true to type.

Cytological studies of some cereals and their hybrids, M. Nakao (*Jour. Col. Agr. Tohoku Imp. Univ., 4 (1911), No. 3, pp. 173–190, pls. 4*).—The author gives the results of studies on the nuclear division of the pollen mother cells of wheat, barley, rye, and a wheat-rye hybrid.

The effect of lime on the vegetation of some tropical mountain barrens, C. C. Hosseus (*Bot. Jahrb. [Engler], 45 (1911), No. 5, pp. 661–669*).—The results of studies on the flora of certain barren regions in the mountains of northern Siam are given.

The soil seems to be derived almost completely from oolitic limestone, and the vegetation is strikingly modified. The plants are mostly perennials, with short, thick, woody stems, and greatly reduced and inrolled leaves with their under sides covered with a felt-like mat of hairs. Most of the plants are more or less covered with hairs throughout. The flowers are, to a considerable extent, light in color, and the buds are provided with protective scales. The root system is as a rule much thickened. On the special geological formations described succulent plants with reduced spreading branches prevailed, and in bamboos and similar plants growing on the limestone formations there was a storage of water in the internodes, and a lack of flowers, due to rudimentary flower formation.

The permeability of the yeast cell, S. G. PAINE (*Proc. Roy. Soc. [London], Ser. B, 84 (1911), No. B 572, pp. 289–307*).—Early experiments on plasmolysis of yeast cells seemed to indicate that the envelope is impermeable by inorganic salts, while readily permeable to alcohol, etc. Quantitative estimations have shown the power of diffusion of alcohol to be very different from that of inorganic salts. Alcohol is believed to diffuse readily into the cell. All salts which have been tried have been taken up by yeast from moderately concentrated solutions, and in the case of sodium chlorid and ammonium sulphate even from dilute solutions, but since the yeast must of necessity be analyzed as a whole the question as to how far into the cells the various solutions have penetrated must for the present remain in doubt. It seems very probable that the apparent entrance of salts is the result of adsorption in the surface layers rather than of absorption, or it may be that the salt particles are kept back by a differential septum according to the hypothesis of Armstrong (E. S. R., 21, p. 126).

On the metabolic changes due to geotropic stimulation, II, V. GRAFE and K. LINSBAUER (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 119 (1910), I, No. 8, pp. 827–852*).—After giving brief notes on some work done by others, the authors continue an account of their own investigations (E. S. R., 23, p. 723), seeking to establish a basis for a chemical theory of geotropism. The results were mainly negative. Geotropic stimulation was not found to be connected with any regular difference in catalysis.

On the precipitation of iron by light and by green aquatic plants, H. MOLISCH (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 119 (1910), I, No. 8, pp. 959–984, pl. 1*).—The author worked on the hypothesis that green submerged aquatic plants are able to precipitate within themselves iron from solutions and thereby to furnish material for bog iron ore. Experiments were conducted with dilute solutions of iron compounds in light and in darkness, and also with green aquatic plants in such solutions both exposed to light and protected therefrom.

It was found that while iron was precipitated spontaneously from some compounds in darkness, from others it was deposited only in the light. In the latter case the process was usually favored by the presence of the green plants, of which *Elodea canadensis* deposited the red oxid of iron in the outer layers of its epidermal cells, sometimes in concentric strata. In darkness the plants usually showed no precipitation, or less, and that at a slower rate.

The conclusion is reached that green aquatic plants probably play a certain part in nature in the formation of iron ore beds.

Peroxidase and the respiratory pigments of plants, W. PALLADIN and P. IRAKLIONOFF (*Rev. Gén. Bot., 23 (1911), No. 270, pp. 225–247*).—A study has been made of yeasts, molds, and a number of higher plants to determine the relation of peroxidase and the respiratory pigments which they may contain, and the authors claim that their results have an important bearing on the theory of normal respiration.

They found that the quantitative distribution of peroxidase in plant tissues coincided with that of the respiratory pigments. Tissues rich in peroxidases were also well supplied with chromogens. In some plants the peroxidase is found in a free state, while in others, such as pea seeds, it is in a fixed form. The presence of albuminoid substances complicates the isolation and purification of peroxidase. From such plants as the watermelon, pumpkin, etc., which are very poor in albuminoids, the authors state that peroxidase may be readily separated by precipitation with mercuric chlorid, but with wheat embryos the isolation is less successful, and it fails altogether with peas. A solution of sodium chlorid may be used for isolating peroxidase when water gives negative results. Potassium phosphate was found to be an excellent solvent of

peroxidase. Pure peroxidase, it is claimed, does not give any color reaction with aloin, but most plants contain substances that favor the color test for the presence of peroxidase.

In regard to the respiratory pigments, they were found to vary with different plants. In some plants sodium chlorid was found to stimulate the development of chromogens, but in wheat seedlings and etiolated stems of beans they were retarded. Emulsin is said to hasten the appearance of respiratory pigments in wheat embryos, but to check them in bean seedlings. Sodium chlorid had a retarding effect on the development of respiratory pigments in some plants, but stimulated them in other cases when used in conjunction with emulsion.

On the presence of a glucosid in the leaves of pears, and investigations of its occurrence in the trunk and roots, E. Bourquelot and Mlle. A. Fichtenholz (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 8, pp. 468–471*).—In a previous publication (E. S. R., 24, p. 31), the authors called attention to the occurrence of a glucosid, which they determined as arbutin, in the leaves of 3 varieties of cultivated pears. Since that publication they have continued their observations and studied a considerable number of varieties of cultivated as well as wild pears and found the arbutin present in the leaves of all. It was also found present in the tips of the branchlets, in the bark of the trunk, and in the roots, but in the latter two organs it had nearly disappeared.

Carbon dioxid at high pressure and the artificial ripening of persimmons, F. E. Lloyd (*Science, n. ser., 34 (1911), No. 887, pp. 924–928*).—The author summarizes some investigations on the loss of astringency of persimmons, dates, and similar fruits, and claims, on the basis of his investigations, that the loss of astringency during the process of ripening is due to the union of tannin with an associated colloid of a carbohydrate nature.

He reports experiments with the artificial ripening of persimmons in carbon dioxid and states that under increased pressure of carbon dioxid the process of ripening is hastened, so that with a pressure of 15 lbs. the time required may be reduced from 6 or 7 days, the time required under normal pressure, to less than 2 days.

Evidence is presented that at the time of ripening an enzymatic agent is at work aiding in the coagulation.

A manual of poisonous plants, II, L. H. Pammel (*Cedar Rapids, Iowa, 1911, pt. 2, pp. V+153–977, pls. 15, figs. 500*).—This is the second portion of a manual of poisonous plants, chiefly of eastern North America, with notes on economic and medicinal plants (E. S. R., 24, p. 384). The author includes all species of plants that in any way produce injury to man or animals, although many listed have very important uses that more than compensate for their injurious properties. A catalogue of the poisonous plants of the world compiled from various sources is given, and the work is concluded with a comprehensive bibliography of poisonous plants, compiled by Miss Harriette S. Kellogg, more than a thousand papers being listed.

American medicinal leaves and herbs, Alice Henkel (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 219, pp. 56, figs. 36*).—This bulletin gives a description of 36 species of plants which furnish leaves and herbs for medicinal use, 15 of which are official in the United States Pharmacopœia.

FIELD CROPS.

The influence of different degrees of soil moisture content and soil compactness and of different fertilizer applications on root development in wheat and barley during the early stages of growth, R. Polle (*Jour. Landw., 58 (1910), No. 4, pp. 297–344*).—Chevalier barley and Bordeaux wheat were grown

in pot experiments to determine the influence of fertility, moisture content, and soil compactness on the development of the root system and on the weight of the underground and aboveground portions of the plants. A clay and a sandy soil were used. The fertilized pots received a complete fertilizer application, in addition to which the sandy soil of the fertilized series was treated with calcium carbonate. The soil moisture content, based on the water-holding capacity of the soil, dried at 100° C., was held in the dry series of the clay soil at 11.25 per cent and in the moist series at 19 per cent, the corresponding figures for the sandy soil being 5.4 and 9 per cent, respectively. The soil, sifted to remove lumps and coarse particles, was placed loosely in the one series of pots, while in the other it was tamped by layers to insure uniform compactness up to the upper 2 or 3 cm., which remained loose and friable.

In the experiments with barley a comparison of the fertilized and unfertilized series of pots showed that the unfertilized sandy soil produced the highest absolute weight of root material. This was also true of the clay soil with high moisture content, but in the dry series the fertilized soil produced the larger absolute weight. Determinations of the weight per unit length of the roots indicated that the fertilized soil produced, to some extent, stronger and thicker roots than the soil which had received no fertilizer treatment. It was further found that in most cases a unit weight of root material in the fertilized soil produced a slightly larger amount of substance above ground than the same unit weight in the unfertilized pots. The conclusion is drawn that during the early vegetative period, when the plants used the nutriment stored in the seed, the fertilization of the soil had but little effect upon the production of organic substances.

The clay soil in every instance produced a higher absolute weight of root material in the dry series than in the moist series of tests. The sandy soil in general yielded the largest amount of root material by weight when supplied with the larger quantity of moisture. The roots in themselves developed stronger or denser in the dry than in the moist sandy soil, but this was not so evident as in the clay soil. The results also demonstrated that the plants required less water for their development and maximum production on the sandy soil than on the clay soil when other conditions were the same.

The compactness of the soil apparently had no influence on the number of main roots, but the lateral roots were most numerous in both clay and sand in the compact series with high moisture content and in the pulverized or loose series with low moisture content. The length of the roots in general was but little affected by the degree of soil compactness. It was found, however, that the roots were longer in the dry and pulverized series of the clay soil than in the dry and compacted series. The area of root surface produced was found to be largest in the loose or untamped soil, but the highest absolute weight of root substance was obtained in the pots in which the soil had been tamped. With both clay and sand the compacted series yielded in every case the largest quantity of substance above ground. This result is regarded as due to the greater capillarity of the compacted soil and to the greater area of root surface in contact with soil particles under this condition. The conclusion is drawn that a compact soil adequately provided with moisture and containing sufficient plant food in readily available form favors the development of the parts of the plant above ground during the earlier stages of growth to a greater degree than does a loose soil. In general a unit weight of root substance in the compacted soil yielded a larger quantity of substance above ground than the same unit weight in the loose soil. The low moisture series yielded less substance above ground than under ground in the clay soil and slightly more in the sandy

soil. In the high moisture series the weight of the substance above ground ranged from 150 to 200 per cent of the weight of the root system.

The experiments with wheat likewise showed that in general during the early vegetative period a larger root system was developed in the unfertilized than in the fertilized soil. The length of the roots as well as the weight of the root material was the greater in the unfertilized pots. The thickness of the roots in the clay soil was apparently not influenced by the fertilizer applied, but in the sandy soil the weight of the root substance was in all cases higher in the fertilized than in the unfertilized pots. A unit weight of root material produced a greater quantity of plant substance above ground in the fertilized than in the unfertilized soil. The production of plant material above ground per unit weight of root substance was increased considerably by a high moisture content and soil compactness. As in the work with barley, the larger root systems were produced in the series of high soil moisture content, but the greater absolute weight of root substance was secured in the dry series of tests. The influence of soil moisture was in general the same for the two crops and the author lays stress upon the fact that the favorable early development of the underground and aboveground parts of the plants is dependent, to a very great extent, upon the soil moisture.

In studying the influence of soil compactness it was found that in the loose clay soil the plants produced the longest main roots, while in the compacted clay the lateral roots were the longer and the more numerous. The largest quantity of underground substance in both clay and sand was secured in the loose soil with high moisture content and in the compacted soil with low moisture content. Generally the absolute weight of root substance was correlated with the size of the root system but in the dry clay series the largest main roots were produced in the loose soil, while the largest weight of root substance was obtained in the compacted soil. The data for both barley and wheat show that the weight per unit of root length was the greater in the compacted soil series.

Field experiments, 1910 (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 2, pp. 238–302*).—These pages report the results of field experiments with barley, hay, potatoes, mangels, oats, turnips, and wheat, each tested at a number of different farms.

A comparative test of Danish Archer barley grown from freshly imported seed and also from seed grown in Ireland for 4 years showed no significant difference in yield or quality. Experiments testing the effect of applications of sulphate of ammonia, superphosphate, and kainit, alone and in various mixtures, indicate that the use of a mixture of 1 cwt. sulphate of ammonia, 3 cwt. of superphosphate, and 3 cwt. kainit per acre is the most remunerative on barley ground. On soils that are too rich or on meadow land the use of from 2 to 3 cwt. of kainit per acre proved efficacious in preventing an overgrowth of straw.

In tests with hay conducted at 15 different points, applications of farmyard manure, nitrate of soda, superphosphate, and kainit singly and in various combinations were followed by increases in the returns secured ranging from 7 cwt. 3 qrs. after 1 cwt. nitrate of soda to 15 cwt. 3 qrs. after an application of 1 cwt. nitrate of soda, 2 cwt. superphosphate, and 2 cwt. kainit. The use of nitrate of soda alone is not recommended for hay under ordinary conditions.

Applications of farmyard manure, sulphate of ammonia, superphosphate, muriate of potash, and sulphate of potash singly and in various mixtures to potatoes were followed by increases in the yields ranging from 4 tons 5 cwt. after an application of 15 tons of farmyard manure to 7 tons 3 cwt. after the application of a mixture of 15 tons farmyard manure, 1 cwt. sulphate of am-

monia, 4 cwt. superphosphate, and 1 cwt. muriate of potash. Tests of sprouting potatoes at various points show average gains following sprouting which ranged from 3 cwt. to 3 tons 17 cwt. per acre in 1910. During the period 1903–1910, the average results of 676 tests show an average gain per acre following sprouting amounting to 2 tons 4 cwt.

In a test of applications of farmyard manure, superphosphate, sulphate of ammonia, kainit, salt, and nitrate of soda in various mixtures to mangels, increases in yield were secured ranging from 14 tons after an application of 20 tons of farmyard manure to 24 tons 1 cwt. after an application of 20 tons of farmyard manure, 4 cwt. superphosphate, 2 cwt. sulphate of ammonia, and 4 cwt. salt. The same relative results are shown by the average yields of the 4 years 1906–1909. Applications of 3, 4, and 5 cwt. superphosphate with dung, sulphate of ammonia, and salt gave apparently equal average profits during the years 1908 and 1909. An application of 1 cwt. of sulphate of ammonia per acre supplemented by dung, superphosphate, and salt resulted in a slightly smaller total yield of mangels per acre but a somewhat greater average profit during 1908 and 1909. An application of 4 cwt. of salt supplemented by dung superphosphate, and sulphate of ammonia was followed by a higher average yield per acre and a higher average net profit per acre during 1908 and 1909 than when 2 cwt. or 6 cwt. were used. The mixture recommended for the mangel crop, therefore, is 4 cwt. superphosphate, 2 cwt. sulphate of ammonia, and 4 cwt. salt per acre.

In a test of applications of sulphate of ammonia, superphosphate, and kainit applied singly and in various combinations to oats, the increases in yield secured ranged from 2 cwt. 2 qrs. after an application of 1 cwt. of sulphate of ammonia to 7 cwt. of grain after the application of a mixture of 1 cwt. of sulphate of ammonia, 3 cwt. superphosphate, and 3 cwt. kainit. The average yield secured during the 4 years 1906–1909 give to various applications the same relative standing as those indicated by the yields of 1910. An application of 3 cwt. superphosphate, supplemented by sulphate of ammonia and kainit was followed by a greater grain yield and a greater profit due to the use of artificial manures during 1908 and 1909 than when 2 or 4 cwt. of superphosphate was used with the same supplementary fertilizers. Similarly the use of 2, 3, and 4 cwt. of kainit each supplemented by sulphate of ammonia and superphosphate was followed by approximately equal grain and straw yields during 1908 and 1909, but the greatest profit resulted from the use of 2 cwt. Although the results have not been uniform during the last 3 years distinctly the best results have, on the whole, followed the use of a mixture of 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, and 3 cwt. kainit per acre.

In a test with turnips of farmyard manure, superphosphate, sulphate of ammonia, and kainit, singly and in various combinations, the increases in yield due to the manures ranged from 11 tons 9 cwt. in case of 10 tons of farmyard manure to 17 tons 16 cwt. after an application of a mixture of 10 tons of farmyard manure and 4 cwt. superphosphate, 1 cwt. sulphate of ammonia, and 3 cwt. kainit. In a fertilizer test made without farmyard manure, when superphosphate, sulphate of ammonia, and kainit were applied singly and in various mixtures, the increase in yields over the check plat ranged from 12 tons 17 cwt. after 4 cwt. of superphosphate to 20 tons 9 cwt. after an application of a mixture of 6 cwt. superphosphate, 1½ cwt. of sulphate of ammonia, and 4½ cwt. kainit per acre. In a test of applications of 4, 5, and 6 cwt. of superphosphate, each supplemented by dung, approximately equal profits were secured from the 2 larger applications during the years 1908 and 1909. Similarly, applications of 4, 5, and 6 cwt. of basic slag, each supplemented by dung, gave approximately equal values of crop after deducting the cost of manure, but in case of appli-

cations of 4, 5, and 6 cwt. of superphosphate, each supplemented with sulphate of ammonia and kainit, a slightly greater value of crop after deducting the cost of manures, resulted from the heaviest application of superphosphate. Similarly, a slightly greater return was secured from 6 cwt. of basic slag than followed the use of 4 or 5 cwt. each supplemented with sulphate of ammonia and kainit.

Variety tests of wheat, potatoes, mangels, turnips, and oats are also reported.

[Experiments with field crops in 1906, 1907, and 1908] (*Otchet Shatilov. Selsk. Khoz. Opytn. Stantsii, 6 (1910); abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 1, pp. 96–100*).—Among other general observations a study was made of the residual effect of barnyard manure and commercial fertilizers.

Plats treated with barnyard manure 5 years before showed the effect of this application in the crops of oats and winter cereals. In 1906, buckwheat on land which had received an application of barnyard manure in 1900 gave a smaller yield than a crop produced on plats which had received no manure. This result is considered due to the larger crops secured from the manured plats during the intervening years, which led to an actual exhaustion of soil fertility by reason of the manure applied 7 years earlier.

Plats treated with commercial fertilizers in 1900 all produced much better crops in 1901 than the check plats but in 1907 after 5 crops had been removed during this period the yields on these plats were smaller than on the plats not treated with commercial fertilizers in 1900.

In trials of Thomas slag, application in the drill, although favoring the early development of the plants, did not give as good results as applying the substance broadcast. The first year the application of the slag in the drill seemed to have reduced the proportion of straw and increased the proportion of grain as compared with broadcasting the fertilizer, but the second year the proportion of straw was the greater on the plats receiving the slag in the drill, while on the plats treated broadcast the proportion was the same as on the check plats.

Harrowing winter cereals in the spring usually lowered the yield and was never of any apparent benefit. In 7 years' tests sowing oats broadcast gave larger yields than sowing in drills.

Suggested cropping systems for the black lands of Texas, B. Youngblood (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 84, pp. 21, figs. 13*).—This is a report of work which the author regards as "preliminary to a more extensive and detailed study of farm-management problems in the black-land belt."

He suggests deep fall plowing and the rotation of resistant with nonresistant crops, and the incorporation of organic matter into the soil, as measures which will largely overcome the evil effects of Texas root-rot. As legumes are less affected cowpeas and alfalfa are suggested. Alfalfa is killed by root-rot in from 2 to 5 years but has proved a paying crop in a short rotation with grain. Cowpeas may be grown successfully on the black lands in the ordinary cotton, corn, and oats rotation by planting them in alternate rows with the corn, or after the oats in rows, and cultivating them 2 or 3 times. On one farm studied a 4-year rotation used provided for (1) wheat or oats, (2) legumes, (3) corn, milo maize, or sorghum, and (4) cotton. The author believes that a mixed rotation similar to this one will be most satisfactory on most black-land farms.

Alfalfa in Ohio—a field study, W. M. Cook (*Ohio Sta. Circ. 113, pp. 3–56, figs. 26*).—This paper, presented in connection with the agricultural survey of Ohio, is a progress report of a field study of the alfalfa crop on about 300 well distributed farms in that State. The principal topics discussed are the soil, climatic, fertilizer, and cultural requirements of alfalfa, nurse crops, and the

seeding and other problems connected with its production, harvest, and utilization.

Plans for distributing Bermuda grass, O. O. CHURCHILL (*Oklahoma Sta. Circ. 17, pp. 3, fig. 1*).—Suggestions for securing a stand of Bermuda grass, together with an outline of the plan adopted by the station for distributing the roots, are given.

Selection of corn for seed and for show, C. B. HUTCHISON (*Missouri Sta. Circ. 50, pp. 123–134, figs. 7*).—A brief discussion of the characteristics of a good ear and directions for selecting corn for seed and for show are followed by a score card of the Missouri Corn Growers' Association and directions for the application of the points of this score card. Suggestions are also given for the preparation of ear corn for shipment.

The story of cotton and the development of the cotton States, E. C. BROOKS (*Chicago and London, [1911], pp. X+370, pls. 2, figs. 101*).—This book discusses the cotton industry in the United States from a historical, sociological, economic, and industrial viewpoint, and considers in the concluding chapters the culture of cotton and the by-products of the crop.

German colonial cotton reports, 1900–1908, K. SUPF (*Deut. Kolon. Baumwoll Unternehm., Ber., 1–10 (1900–1908), pp. IV+306, pls. 19, figs. 22*).—This publication is a collection of reports on cotton growing in the German African colonies made by special commissions sent out by the government to study the field, and by the directors of experiment fields already established in those regions. Statements made by private parties actually engaged in the work are also included.

The rice plant, J. VAN BREDA DE HAAN (*Meded. Dept. Landb. [Dutch East Indies], 1911, No. 15, pp. 53+III, pls. 21*).—An anatomical description of the rice plant, including a study of the glumes, the fruit, the embryo, the root, the stem, the leaves, and the flower.

The rice plant, H. C. H. DE BIE (*Meded. Dept. Landb. [Dutch East Indies], 1911, No. 16, pp. 38*).—This article is a brief description of rice culture as carried on by the native population of Java.

The action of large applications of nitrogen on the sugar beet, A. HERKE (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 5, pp. 669–679*).—A study of the relative growth of leaf and root and of the sugar-producing quality of beets grown on soils receiving applications of nitrate of soda supplying from 30 to 180 kg. of nitrogen per hectare (from 26.7 to 160.2 lbs. per acre) indicated that when a sufficient amount of water was present the yield of sugar beets was increased by the application of the nitrogenous fertilizer to sandy soils, but that the increase in growth of leaves was much greater than that of roots. The sugar content increased with the increase in amount of nitrogen applied, but the nitrogen content of the beets increased to a greater extent than the sugar, the increase of harmful nitrogen compounds being especially great, thus reducing the quality of the beets. When the nitrate was supplied in moderate amounts in connection with potash and phosphoric acid on soils poor in nitrogen, the sugar content of the beets was increased without injury to the quality through the formation of nitrogenous compounds.

The pollination of the sugar beet by the field beet and its influence on the chemical composition of the progeny, K. ANDRLÍK, V. BARTOŠ, and J. URBAN (*Ztschr. Zuckerindus. Böhmen, 35 (1910), No. 1, pp. 1–10, figs. 3*).—One half of a sugar beet was planted among field beets, while the other half was set out in a field of sugar beets. The seed produced by each part was planted for comparative study of the progeny.

Of the beets secured from the seed of the half pollinated with pollen from field beets, 19 per cent were white and 81 per cent red. The form of the beets

also showed considerable change. The progeny of the half set out among sugar beets were uniform in shape and all specimens were white in color.

The sugar content in the cross showed a reduction of 3.7 per cent in the red and of 3.4 per cent in the white beets. The dry matter in the root showed a loss of 18.8 per cent in the white and of 25.5 per cent in the red beets as compared with the pure-bred sugar beets. The total nitrogen suffered a reduction of about 10 per cent in the cross while the pure ash was increased about 27 per cent. The pure ash in the roots of the cross-bred beets contained more alkali and chlorin and less phosphoric acid, magnesia, and lime than was found in the roots of the pure-bred individuals.

Sugar beets in water cultures, R. SCHANDER and H. RÜGGEBERG (*Ztschr. Ver. Deut. Zuckerindus., 1911, No. 670, II, pp. 969–974, fig. 1*).—This article reports the experimental culture of sugar beets in nutrient solutions for purposes of investigation. A specimen was secured weighing 485.2 gm. with 79.5 gm. of dry matter and 6.46 gm. of ash. The behavior of the plant during the different periods of growth is described and the method of culture followed is given in detail.

Nicotin content of some German tobaccos and the distribution of nicotin in the tobacco plant, R. GAZE (*Apoth. Ztg., 26 (1911), No. 90, pp. 938, 939*).—The results of experiments reported indicate that the alkaloid content of the leaves as well as of the midrib varies in individual plants of the same type, and that the point is lower in alkaloid content than other portions of the midrib.

Maryland weeds and other harmful plants, J. B. S. NORTON (*Maryland Sta. Bul. 155, pp. 71, figs. 56*).—This is a bulletin on the life habits of weeds, their injuries to agriculture, and the principal agricultural types. A key and other helps are given for the identification of the principal weeds of Maryland. Other topics dealt with are pure seed regulations, weed study in the public schools, weed eradication, and poisonous plants.

A chart shows the results as to the growth of various grasses and weeds, and of treatment with various manures, potassium iodid, and iron sulphate. In general, the percentage of weeds was low on all plats and showed little variation.

Iron sulphate has been found of special value in controlling chickweed and other early weeds in strawberries, alfalfa, and other crops. It was used at the rate of 1½ to 2 lbs. per gallon of water during the dormant season, preferably in the fall after frost when the weeds were small. A list summarizes the effect of iron sulphate on different species as observed by the author and as reported by others.

Spraying horse nettle with iron sulphate killed the terminal portions but not the well-developed leaves and stems. In 1908 it was unsuccessful on winter cress in field spraying, but entirely killed the plants in the damp atmosphere of the greenhouse. The spray was much more effective if the plants were injured by insects, mowing, or otherwise.

In tests of sprays of dissolved fertilizers, nitrate of soda proved best but was expensive and if used alone in sufficient strength added too much nitrogen to the land. The author prefers a mixture of 1¼ lbs. kainit and ½ lb. nitrate of soda per gallon. Salt proved as effective but lacked the fertilizing value. Fifty gallons per acre applied as a fine spray was necessary in case of either fertilizers or iron sulphate. Tests in March resulted in very little injury from the fertilizers, but field sprayings made with the nitrate of soda-kainit mixture in the hot dry summer of 1909 killed almost everything except the grasses, the clovers being almost destroyed.

Cuttings of various weeds and other plants were immersed, except the cut ends, in a number of strong solutions. After 2 hours they were removed, washed,

and the cut ends placed in water. The next day those taken from the potassium and sodium nitrate solutions had recovered except that some leaf tips were dead. Greater injury was observed in those taken from the iron sulphate which showed black spots, while many of those from the sodium arsenite were still wilted or were turning yellow.

A small alfalfa plat sprayed in March, 1909, with 2 lbs. of iron sulphate per gallon of water and another with a nitrate of soda-kainit mixture showed somewhat lower yields than the unsprayed plats, but practically no weeds except couch grass were present on any of the plats.

July 3, 1907, 6 oz. each of the following substances were applied around the roots of peach trees diseased with yellows in the effort to find something that could be used to kill quickly trees: Chromic acid (½ oz. in water), kerosene, copper sulphate (1 oz. in water), carbon bisulphid, caustic soda (2 oz. in water), salt (saturated solution in water), sodium hyposulphite (2 oz. in water), potassium cyanid (½ oz. in water), commercial sulphuric acid, 2 per cent corrosive sublimate, sodium nitrate (1½ oz. in water), iron sulphate (1½ oz. in water), gas tar, sulphurous acid. The earth 2 in. deep was raked away from the tree and replaced after the chemicals had been poured in. Five days later, leaves on the copper sulphate and carbon bisulphid treated trees showed marked injury, but no others showed any effect. The copper sulphate-treated trees recovered but those treated with carbon bisulphid died in a short time. In the winter of 1909–10, sodium arsenite 4 to 8 oz. per gallon, salt 2 lbs. per gallon, 1 to 2 gal. to a linear rod, and kerosene ¼ to 1 gal. per rod, poured around the roots of Japanese quince hedge failed to kill because of sprouting from the roots some distance from the base of the stems.

In September, 1909, kerosene, sodium arsenite (½ oz. per qt.), carbon bisulphid, and chromic acid (½ oz. per qt.), were applied at the base of young ½ to 1 in. apple, peach, black locust and sumac trees, about ½ oz. per tree being given. When examined a few weeks later, it was found that the kerosene caused but little injury to the peach and apple, even when the bark was broken at the base. The sodium arsenite and the carbon bisulphid had killed most of the leaves and probably the whole tree in both peach and apple. No injury from the chromic acid was noted. Another trial with 1 to 2 in. apple trees, in which one of the large branches near the ground was cut and the liquids poured on, resulted similarly, showing marked injury from the sodium arsenite and carbon bisulphid, on the cut side especially, and none from kerosene and chromic acid. Very little injury was noted on the sumac or locust from any treatments. In 1908, when various substances were applied through the cut ends of branches, oxalic acid was found to penetrate and kill the wood and leaves quicker than any other substance tried.

The problem of weeds in the West, L. H. Pammel (*Contrib. Bot. Dept. Iowa State Col., 1911, No. 44, pp. 34–46, pls. 8*).—This is a record of the author's personal observations on the geographical distribution of certain weeds in portions of the United States and Canada.

Near the Canadian boundary line "(*Eleagnus argentea*) spreads rapidly where the surface of the soil has been removed, very much as the cottonwood does in Iowa or in other parts of northern United States.

"In the country from Winnipeg to Vancouver and the Rocky Mountain States, squirrel-tail grass (*Hordeum jubatum*) is one of the most striking weeds in fields and waste places. It is, of course, a striking weed also in Iowa, but it was rare here prior to 1876. . . . The wild oats (*Avena fatua*) is common in the Northwest as it is in parts of Minnesota and the irrigated districts of the Rocky Mountains, largely because the weed is spread with the culture of oats. The holy grass (*Hierochloe borealis*) a well-known native grass of the North

is comparatively rare in Iowa, except northward and it is not known to be weedy in that section of the State. . . . In Utah the *Bromus tectorum* and *H. murinum* have become most troublesome weeds and rapidly spreading to Colorado."

"The Canadian thistle (*Cirsium arvense*) has made its way across the continent from Winnipeg west to Vancouver Island and Seattle. It has become naturalized at numerous points, Winnipeg, Winnipeg Beach, Emerson, Moose Jaw, Calgary, Portal, North Bend (B. C.), Bremerton, Everett, Seattle, Washington. It has spread extensively in Manitoba, occurring in fields, meadows, along roadsides and even occurring in woods. . . . They woolly thistle (*C. canescens*) indigenous to the country and to the South, to western Iowa, to the Rocky Mountains in Colorado and Montana, is common east of Calgary. The field thistle (*C. discolor*) though a common weed in Iowa and Minnesota, is less common in the Red River Valley and only reaches across the border into Manitoba."

"The sow thistle (*Solidago oleraceus*) occurs in Winnipeg, more frequent on the Pacific coast, Seattle, and elsewhere; on the other hand, the perennial sow thistle (*S. arvensis*) is abundant everywhere in Manitoba from Emerson to Winnipeg and westward through the older settled portion of Manitoba."

"The cat's-ear (*Hypochœris radicata*) which is naturalized from Europe and a ballast weed along the northern Atlantic coast, does not occur in the northern Mississippi Valley; it is one of the most common weeds in lawns and in waste places from Oregon to Vancouver and the Vancouver Island."

"The shepherd's purse (*Capsella bursa-pastoris*) is common from Winnipeg to the coast, south to Texas, the Rocky Mountain region, and to the Atlantic coast. It is more abundant in the North than in Iowa because of the cooler climate."

"Of the family Capparidaceæ only 1 species occurs in the Canadian region, namely *Cleome integrifolia*. . . . It is fairly common in Saskatchewan and Alberta, less frequent in Manitoba. It is rare in British Columbia except the more arid portions about Kamloops and Ashcroft."

"The western pigweed (*Monolepis nuttalliana*) is common in Saskatchewan and Manitoba, it is of more frequent occurrence in fields than the common goosefoot and more abundant than the Russian thistle in the region. It has not reached Iowa although found in Minnesota and reported from Missouri by Robinson and Fernald. It occurs in all of the provinces from Winnipeg to British Columbia."

"The common milkweed (*Asclepias syriaca*) occurs occasionally in southern Manitoba and less so in the Saskatchewan, though it is one of the most common weeds in Iowa and Minnesota. Of the family Urticaceæ one weed is common from Kentucky north to Minnesota and Wisconsin and west to the Rockies, and in the Great Basin country, namely the common hemp (*Cannabis sativa*) which has largely spread from cultivated fields of the plant and its use as a bird seed."

"The wild licorice (*Glycyrrhiza lepidota*) is common everywhere on the prairies of Minnesota to Winnipeg west to the provinces of Saskatchewan and Alberta, but less frequent on the west slope, abundant in the Rockies to the Great Basin. The 2 species of sweet clover (*Melilotus alba* and *M. officinalis*) are common in parts of Minnesota and on the west coast."

"The buckhorn (*Plantago lanceolata*) which has been widely distributed in recent years with clover seed in Iowa, occurs throughout the northern Mississippi Valley States and was observed in LaCrosse in 1897. It was not observed in the Northwest provinces, probably largely because clover is not a common crop and the seed is generally distributed with clover seed."

HORTICULTURE.

A model cold storage house, F. A. WAUGH (*Country Gent., 76 (1911), No. 3074, pp. 7, 27, figs. 3*).—A fruit storage and packing plant recently erected at the Massachusetts Agricultural College is illustrated and described.

Fluctuating characteristics of apples, C. H. GOETZ (*Ohio Nat., 12 (1911), No. 1, pp. 406–408*).—A study of fluctuation in characteristics of some 50 varieties of apples was conducted at the Washington Station during the years 1909 and 1910. The results as here presented in tabular form show the percentage of fluctuation in the cavities, size, form, lower basin, apical basin, peduncle, tube, core line, stamens, core, and calyx.

Among other things the investigation has shown that certain varieties of apples exhibit a tendency toward a constancy of characteristics, while others have a great tendency toward fluctuation. The most fluctuating characteristic in all apples was found in size, shape, and appearance of the seed cavities, and the next greatest in the length of the peduncle. There appeared to be very little fluctuation in the shape, size, or form of the calyx in any variety of apples.

The composition of the apple as affected by irrigation, C. E. BRADLEY (*Jour. Indus. and Engin. Chem., 3 (1911), No. 7, pp. 496, 497*).—A large number of analyses were made of apples growing on irrigated and unirrigated experimental plats of the Oregon Station, and the results are here presented in summarized form.

The irrigated samples were somewhat higher in moisture and consequently lower in solids than samples from the dry checks; they also contained higher percentages of sugar based on dry material and were generally larger than the apples from the unirrigated plat. Individual apples from a given plat showed very little variation among themselves.

Peaches for central New York, D. H. AYERS (*Rural New Yorker, 70 (1911), No. 4136, p. 1210*).—Data are given showing the dates of first and last picking of 10 varieties of peaches during the seasons of 1909 to 1911 inclusive, with brief notes on the choice of the varieties for central New York.

Grape propagation, pruning, and training, G. C. HUSMANN (*U. S. Dept. Agr., Farmers' Bul. 471, pp. 29, figs. 30*).—This publication contains popular instructions for propagating, pruning, and training grapes. The subject matter is discussed under the following general headings: Propagation, soil and location, description of the parts of a vine, care and training of young vines, the pruning of bearing vines, training and training systems, and the principal grape regions of the United States.

Date culture in California, J. E. COIT (*Cal. Cult., 37 (1911), No. 26, pp. 673, 680, 681, fig. 1*).—A brief popular survey of the progress of date culture in California.

The propagation of the avocado, P. J. WESTER (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 11, pp. 599–605, pls. 3*).—This comprises a short exposition of the experience gained by the author in the propagation of avocados during 7 years' study of tropical fruits in south Florida.

Tropical fruits in the Visayas, P. J. WESTER (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 10, pp. 545–554, pls. 3*).—The author reports a brief general survey of the fruits and horticultural conditions in the Philippine Islands south of Luzon.

Coconut growing in the Philippine Islands, D. C. WORCESTER (*War Dept. [U. S.], Bur. Insular Aff. [Pub.], 1911, pp. 31, pls. 16; Trop. Agr. and Mag. Ceylon Agr. Soc. 37 (1911), No. 5, pp. 398–410*).—This comprises the results of an investigation relative to the coconut industry in the Philippines. The phases discussed include selection of site; cost of land, clearing, planting,

and cultural operations; yield, harvesting, methods and cost of making copra; enemies of coconuts and means of combating them; and profits. Data are given showing the estimated cost of establishing a 2,500-acre coconut plantation on rented land and covering a period of 8 years.

Yield and cultural value of a number of hazelnuts, E. Gross (*Österr. Gart. Ztg., 6 (1911), No. 12, pp. 441–443*).—This comprises chiefly tabular data showing the yields of several different varieties of hazelnuts in 1911 and the total yield of each variety from the time it commenced to bear.

Pecans, W. N. Hutt (*Bul. N. C. Dept. Agr., 32 (1911), No. 9, pp. 46, figs. 39*).—This is the second report on the behavior of pecan trees throughout the State of North Carolina (E. S. R., 22, p. 144) and deals especially with the results obtained on the experimental orchards of the state test farms. General consideration is given to the adaptability of pecans to different soils and situations, planting operations, and culture, and tabular data are give for 27 varieties showing the budding period, growth performance, period of maturity, and winter condition of twigs and terminals for the season of 1910. The varieties are also described and for the most part illustrated. The results of a cracking test, together with chemical analyses of the kernels of a number of varieties, are also tabulated.

An aberrant walnut, I. D. Cardiff (*Trans. Kans. Acad. Sci., 23–24 (1909–10), p. 138*).—A brief note on some nuts borne on trees, apparently *Juglans nigra*, reported from northern Indiana and southern Tennessee, which in their general characteristics appeared to be hybrids between the walnut and hickory. Experiments are being conducted with material from these trees.

Rhododendrons and azaleas, W. Watson (*London and Edinburgh [1911], pp. XI+116, pls. 8*).—This popular work deals with the cultural requirements of rhododendrons, giving information relative to various species, varieties, and hybrids.

Commercial rose culture, E. Holmes (*New York, 1911, pp. 165, pl. 1, figs. 62*).—A practical guide to the modern methods of growing roses under glass and outdoors for market purposes.

The perpetual flowering carnations, M. Calvino (*Estac. Agr. Cent. [Mexico] Bol. 62, 1911, pp. 28, pls. 26*).—A popular treatise on the culture of greenhouse carnations.

The bulb book, J. Weathers (*London, 1911, pp. XV+471, figs. 342*).—A treatise on bulbous and tuberous plants for the open air, stove, and greenhouse, containing particulars as to descriptions, culture, propagation, etc., of plants from all parts of the world having bulbs, corms, tubers, or rhizomes, with the exception of orchids.

Introductory considerations deal with the general cultural treatment under glass and out-of-doors, together with a classification of bulbous and tuberous plants. The greater part of the work is devoted to descriptions of the genera and species, arranged in alphabetical order with specific cultural notes.

What England can teach us about gardening, W. Miller (*Garden City, N. Y., 1911, pp. XVIII+359, pls. 111*).—This popular work, the chief purpose of which is to inspire people to make more and better gardens, comprises a comparative study of gardening in England and America. Consideration is given to the various types of gardening, such as landscape, formal, wild, water, rock, peat, and rose gardening. The author shows how large sums of money are wasted in this country on unsuitable European material and in attempting effects that never can be imitated. He aims also to show how the best English effects can be produced in spirit at least by using long-lived plants from America and the Far East (Japan, China, and Korea).

The work as a whole is offered as a contribution to the foundation of an American style of gardening. The text is fully illustrated.

General features of a park system for Chattanooga, J. NOLEN (*Boston, 1911, pp. IV+27, pls. 7*).—This comprises a report to the Board of Park Commissioners of Chattanooga. A selected bibliography of parks and related topics, together with a map showing the general features of a park system as planned by the author, are appended.

The engineer's work in grading landscape areas, J. N. AMBLER (*Engin. News, 66 (1911), No. 23, pp. 678, 679, figs. 2*).—A short discussion relative to the treatment of various grading problems in landscape areas. The subject is discussed under the following headings: Surveys and maps, grade surface plane and level, grade surface plane and inclined, grade surface warped, regular curved surfaces, terraced and broken surfaces, irregular, curved, broken, and undulating surfaces, cut and try method, "molded contour" method, method of sections, method of axiometric projection, and execution of the work.

FORESTRY.

Forest physiography, I. BOWMAN (*New York, 1911, pp. XXII+759, pls. 6, figs. 292*).—This comprises a guide to the physiography of the United States and principles of soils prepared especially for students in forestry.

In part 1 consideration is given to the importance, origin, physical and chemical features, water supply, temperature, humus, and nitrogen supply of soils, the soils of arid regions, and soil classification; part 2 describes in turn the physiographic features of the various regions in the United States; and the appendixes contain a scheme of soil classification based upon the mechanical composition of soils, an outline for a soil survey in forest physiography, and analyses of a number of soil types.

History of forestry, B. E. FERNOW (*Toronto, Canada, and Cambridge, Mass., 1911, 2. ed., rev. and enl., pp. XI+506+X*).—In the present edition of this work (E. S. R., 22, p. 738), it is stated that many inaccuracies which occurred in the first edition through lack of sufficient information have been corrected, and the chapter on France has been entirely rewritten and considerably enlarged.

Annual report on the literature and important happenings in the realm of scientific forestry, forest zoology, agricultural chemistry, meteorology, and forest botany for the year 1910, H. WEBER (*Allg. Forst u. Jagd. Ztg., 1911, Sup., pp. VIII+171*).—As in previous years (E. S. R., 23, p. 739), this supplement contains abstracts of the important literature of the various phases of forestry, together with notes on the important occurrences in the forest world for the year 1910. Through the assistance of foreign correspondents, the literature has been made much more international in its scope. The topics included are soil physics, silviculture, forest protection, forest pathology, utilization, technology, management, valuation and statics, mensuration and yields, road building, policy, administration, history, statistics, news of forest unions and hunting clubs, and the zoology of game and fish.

On the valuation of the form of forest trees.—II, The primary type of the pine, T. JONSON (*Skogsvårdsför. Tidskr., 1911, Fackafd., No. 9–10, pp. 285–329, fig. 1*).—Investigations conducted by the author on the primary type and cubical content of pine are reported.

The identification of important North American oak woods, based on a study of the anatomy of the secondary wood, G. B. SUDWORTH and C. D. MELL (*U. S. Dept. Agr., Forest Serv. Bul. 102, pp. 56, figs. 48*).—This bulletin describes the characteristics of the wood and wood elements of 35 oaks, which include all of the commercially useful woods and a number of other species,

the woods of which are likely to become more or less useful in the future. The work is intended especially to aid manufacturers of lumber, architects, builders, and other wood users in identifying the principal oaks. For this purpose illustrations showing enlarged transverse sections of the different woods are included. An analytical key for the identification of the important North American oaks, based on characters of the secondary wood, intended for the use of trained students is also given. Introductory considerations deal with the gross and minute structures of oak woods and the structural characters used for identification.

The bulletin concludes with a table showing the lengths and widths of wood fibers of the most important North American oaks.

Distinguishing characteristics of North American gumwoods, based on the anatomy of the secondary wood, G. B. SUDWORTH and C. D. MELL (*U. S. Dept. Agr., Forest Serv. Bul. 103, pp. 20, figs. 9*).—The gross and microscopic structure of gumwoods, together with the characters used for identification are described, and an analytical key, based on the anatomy of the secondary wood, for the identification of the different species is given, together with descriptions of the different woods and their elements, including also the geographical range of each species, common names, etc.

The African rubber industry and Funtumia elastica ("kickxia"), C. CHRISTY (*London, 1911, pp. XVI+252, pls. 74, figs. 7*).—A treatise on rubber culture in Africa, with special reference to the best methods of cultivating and tapping Funtumia and of the preparation of its rubber.

Manurial experiments with Hevea rubber, R. D. ANSTEAD (*Planters' Chron., 6 (1911), No. 45, pp. 690–692*).—To test the effect of easily soluble and quick-acting fertilizers upon the yield of latex and rubber from Hevea in distinction from the effect of fertilizers upon the growth of the trees, plats of 100 trees each were treated with sulphate of ammonia, nitrate of soda, and saltpeter at the rate of ½ lb. per tree.

As compared with the check plats, sulphate of ammonia gave the best results and the nitrate of soda the next best; saltpeter showed a loss instead of gain, although this fertilizer appeared to improve the general health of the tree. The profit per 100 trees from the use of sulphate of ammonia was about $1.70 and from nitrate of soda about $1.30. No definite conclusions are drawn from this single experiment.

A handbook of forest protection, G. M. HOMANS (*Sacramento: State Bd. Forestry, 1911, pp. 63, figs. 2*).—This contains the California forest laws relating to the prevention of fires, the protection of shade and ornamental trees, and conservation measures, instructions to fire fighters, a synopsis of the game laws, and a list of the fire wardens for 1911.

The prevention of sap stain in lumber, H. F. WEISS and C. T. BARNUM (*U. S. Dept. Agr., Forest Serv. Circ. 192, pp. 19, figs. 4*).—Experimental tests with various chemicals to prevent sap stain in lumber show that in commercial work sap stain can be most effectively prevented by dipping the boards in from 5 to 10 per cent solutions of sodium bicarbonate. The strength of the solution should be determined by the severity of the conditions under which the boards are to season. The chemical should be pure.

Mercuric chlorid solutions were the most effective but being poisonous are not recommended for general use. Solutions of sodium bicarbonate plus lime, magnesium chlorid, calcium chlorid, sodium hydroxid, phenol, copper sulphate, zinc chlorid, and sprinkling the boards with naphthalene did not give satisfactory results.

Freshly cut sap lumber should be stacked in open piles to permit the free circulation of air. Thus piled the boards season in about half the time required

for close piled boards, they are not so severely attacked by insects, and are more effectively protected against sap stain. Sap stain solutions can be applied to the boards more readily and cheaply by machinery than by hand. Hand treatment with sodium bicarbonate solution costs from 21 to 24 cts. and machine treatment from 7 to 10 cts. per 1,000 ft. b. m. Shavings from soda-dipped boards were slightly less inflammable than those from untreated boards.

The comparative strength of untreated and chemically treated woods and of those stained and unstained is briefly discussed in the light of recent tests. At the same moisture content sap stained boards were slightly, but not materially, weaker than those free from stain. Likewise, soda-dipped lumber is just a trifle stronger, stiffer, tougher, and has a greater surface hardness than natural lumber.

Review of forest administration in British India for the year 1909–10, F. B. BRYANT (*Rev. Forest Admin. Brit. India, 1909–10, pp. II+49*).—This is the customary report for the year 1909–10 relative to forest operations in the different Provinces of British India. The data given and discussed deal with alteration in area, forest settlements, demarcation, and surveys, the development of working plans, roads, bridges, and miscellaneous work, forest protection, silviculture, exploitation, yields, revenues, and exports, including financial results for the year.

There were added to the area under the control of the forest department during the year 3,777 sq. miles, making a total of 245,551 sq. miles, or 24.9 per cent of the total area of British India.

Report of the forestry department of Sweden, 1910 (*Skogsvårdsför. Tidskr., 1911, Allmänna Delen, No. 9–10, pp. 332, pl. 1*).—A report on the administration and work of the forest service in the different counties of Sweden during the year. Statistical tables for the whole country are appended.

The National Forest manual.—Timber sales, administrative use, timber settlement, free use (*U. S. Dept. Agr., Forest Serv., 1911, pp. 90*).—This comprises regulations of the Secretary of Agriculture and instructions to forest officers relating to and governing timber sales, administrative use, timber settlement, and the free use of timber and stone upon National Forest lands, issued to take effect December 1, 1911.

The National Forest manual.—Claims, settlement, administrative sites (*U. S. Dept. Agr., Forest Serv., 1912, pp. 56, figs. 4*).—This comprises regulations of the Secretary of Agriculture and instructions to forest officers relating to claims, settlement, and administrative sites of National Forest lands, issued to take effect February 1, 1912.

DISEASES OF PLANTS.

Cultures of Uredineæ in 1910, J. C. ARTHUR (*Mycologia, 4 (1912), No. 1, pp. 7–33*).—A report is given of culture experiments carried on under the author's direction to determine the alternate hosts of a number of heterœcious rusts. Some 34 species that have been previously reported by the author or other investigators are listed, together with 6 which are now reported for the first time. These species are as follows: *Puccinia crandallii*—teleutospores from *Festuca confinis* grown on *Symphoricarpos racemosus; P. quadriporula*—teleutospores from *Carex goodenovii* grown on *Aster paniculatus; P. lithospermi*—teleutospores from *Evolvulus pilosus* grown on the same host; *Uromyces acuminatus*—teleutospores from *Spartina michauxiana* grown on *Polemonium reptans; Colcosporium vernoniæ*—æcidiospores from *Pinus tæda* grown on *Vernonia crinita;* and *Melampsora albertensis*—teleutospores from *Populus tremuloides* grown on *Pseudotsuga mucronata.*

Fourth supplementary list of parasitic fungi of Wisconsin, J. J. DAVIS (*Trans. Wis. Acad. Sci., Arts, and Letters, 16 (1909), pt. 2, No. 1, pp. 739–772*).—This is a list of species, mostly recorded before, but not as growing on the hosts here given, also new species with their hosts, as follows: *Phyllosticta discincta* on *Uvularia grandiflora* and *Smilacina* spp., *Cercospora epigæina* on *Epigæa repens*, *Cylindrosporium betulæ* on *Betula pumila*, *C. ribis* on *Ribes* spp., *Glœosporium thalictri* on *Thalictrum dasycarpum*, *Phyllosticta apicalis* on *Salix lucida*, *P. diervillæ* on *Diervilla trifida*, *P. mulgedii* on *Lactuca leucophæa*, *Ramularia paulula* on *Hypericum virginicum*, and *Septoria parietariæ* on *Parietaria pennsylvanica*.

An index of hosts is also given.

Some fungus diseases of field crops, W. LOCHHEAD (*Ann. Rpt. Quebec Soc. Protec. Plants [etc.], 3 (1910–11), pp. 67–77, figs. 5*).—A description is given of loose smut of oats, loose smut of wheat, stinking smut of wheat, loose smut of barley, covered smut of barley, and corn smut, with some suggestions for their treatment.

Some contributions to the life history and cytology of the smuts, B. F. LUTMAN (*Trans. Wis. Acad. Sci., Arts, and Letters, 16 (1910), pt. 2, No. 4, pp. 1191–1244, pls. 8*).—After a brief account of previous investigations on the characteristics and probable relationships of the various groups of smuts (E. S. R., 23, p. 345), the author gives the results of his own studies on the life history and cytology of certain species of Ustilago, Urocystis, Doassansia, and Entyloma.

As a result of these investigations he claims that characteristics of the Ustilago group, such as the simple spores produced by the breaking up of the mycelium, the multinucleated mycelium during the entire life cycle, the intercellular mycelium without haustoria, and the typically four-celled promycelium are in striking contrast with the elaborate and varied spore balls, the spores produced on lateral branches, the haustoria, the presence of binucleated cells, and the nonseptate promycelium found in the Tilletia, Entyloma, and Urocystis division. The general conclusion is reached that the 2 divisions of the smut group may be more distantly related than is commonly supposed.

F. Zach's investigations on the rust spots of the grains and the mycoplasm theory, J. ERIKSSON (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 119 (1910), I, No. 9–10, pp. 1043–1050*).—After a brief mention of some previous discussions of his theory of a mycoplasm, the author considers the citations and investigations of F. Zach (E. S. R., 25, p. 652).

It is claimed that the mycelial threads observed and described belong to a later stage of development of the fungus than the mycoplasm stage. This the author has verified by later investigations of like materials under higher magnifications, and he claims that his theory is not impaired by results so far published.

Botryosphæria on cotton bolls, C. W. EDGERTON (*Mycologia, 4 (1912), No. 1, pp. 34–36*).—The author reports among the fungi of minor importance on cotton bolls a pyrenomycete which has been provisionally referred to *B. fuliginosa*.

In making a study of some of the diseases of cotton, the author found this fungus on cotton bolls in Louisiana and began a study of the life history to determine its connection with some of the imperfect fungi which are instrumental in causing boll rots. Two stages of the fungus have been found, a pycnidial one, which belongs to the genus Macrophoma, and the perfect or ascogenous stage, which is described at some length.

Inoculation experiments were undertaken to prove the identity of the 2 forms, and as a result the author claims that the 2 stages belong to the

same fungus. It is believed questionable whether the Botryosphæria which he has studied is really the same as the one common on a large number of woody plants throughout the country. In conclusion he states that as the Botryosphæria found on cotton bolls in the South is not connected with a Diplodia, it would appear to be specifically distinct from the common form.

Some field experiments with potato rot, J. F. MONROE (*Ann. Rpt. Quebec Soc. Protec. Plants [etc.], 3 (1910–11), pp. 41, 42*).—A brief report is given of experiments with 29 varieties of potatoes for the prevention of rot by means of the application of Bordeaux mixture. The plants were sprayed 5 times throughout the season, and an arsenical was added to the first application.

The season, it is said, was eminently favorable to the development of the rot, and tabulated data showing the yields indicate that with many varieties a large percentage was diseased, even where the plants had been sprayed. A few varieties showed remarkable disease resistance.

Experiments with potato scab, C. VON WAHL (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb., 1910, pp. 58–60*).—Experiments were carried on for 2 years.

Corrosive sublimate solution of 0.05 per cent and Bordeaux mixture of 2 per cent, both applied to the seed potatoes for 1½ hours, gave excellent and about equal results in the prevention of scab, as was also the case with Bordeaux mixture of 2 per cent applied to 2 lots for 3 and 14 hours, respectively, and with 2 lots treated with 4 kg. per are (356 lb. per acre) of sulphur mixed with the soil, one lot having been also thoroughly rubbed with sulphur before planting. A peat mold dressing of 35 cm. depth appeared to give some protection against the development of scab, while a sand dressing of the same depth afforded none. On both the plats treated with soil dressing the next year's crops were found to be healthy.

Experiments with the application of lime as a remedy against finger-and-toe disease, F. K. RAVN (*Tidsskr. Landbr. Planteavl., 18 (1911), No. 3, pp. 357–392*).—The experiments showed that Dales Hybrid turnip is relatively resistant, but not immune to the disease. Applications of lime were only successful when sufficient amounts were supplied (24,000 lbs. calcium carbonate per töndeland, or 1.38 acres, on the soil experimented with) to make the reaction of the soil strongly alkaline. No material difference in the effect of the lime was observed whether this was harrowed or plowed into the ground, nor did air-slaked quicklime produce appreciably better results than corresponding quantities of calcium carbonate.

Lampsana vulgaris as a host plant of lettuce Peronospora, E. NOFFRAY (*Jour. Agr. Prat., n. ser., 22 (1911), No. 51, pp. 781–783*).—The author calls attention to the fact that the principal host plant for the lettuce mildew (*Peronospora gangliformis*) is the uncultivated plant *L. vulgaris*. For the prevention of attack in lettuce beds, the author recommends the destruction of all weeds of this species, together with those of the common senecio, as it also is a host of the parasite.

Experiments on spore germination and infection in certain species of Oomycetes, I. E. MELHUS (*Wisconsin Sta. Research Bul. 15, pp. 25–91, pls. 7*).—An outline is given of the studies carried on with *Cystopus candidus*, a common parasite of the radish. Investigations were made of the conditions influencing the germination of the conidia, the infection of the host plant, and the occurrence of so-called physiological species of Cystopus on various cruciferous plants.

It was found that the conidia germinated best in water and usually at a low temperature, the optimum being about 10° C., with a range from nearly zero to 25° C. Environmental characters, season, and host vitality seemed to

influence the time required for the spores to germinate, but such factors as evaporation, surface tension, and diffusion of the drop containing the conidia did not influence the percentage of germination. It was found that chilling had a marked effect on the degree of infection secured, and it is thought that this condition is an adaptation of the fungus to its environment. A fall of temperature which leads to the deposition of dew provides a favorable medium in which the zoospores may develop. The experiments showed a close relationship between susceptibility and host vigor in that healthy plants were found to be more susceptible than sickly or abnormal ones.

Repeated infection experiments with conidia from the common radish were made, and no marked differences in susceptibility in varieties of radishes were observed. Other species of cruciferous plants were investigated, and infection was secured with white mustard and cabbage, but at no time was it possible to secure more than 50 per cent of infections of white mustard and still less for cabbage. No infection could be secured on any of the other crucifers tested. These included turnips, black mustard, ruta-baga, shepherd's purse, garden cress, wild pepper grass, hedge mustard, candytuft, water cress, and wall flowers.

A bibliography is appended.

Root knot and its control, E. A. Bessey (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 217, pp. 89, pls. 3, figs. 3*).—This bulletin gives the results and conclusions of studies made by the author on root knot due to *Heterodera radicicola*, which is widespread throughout warm temperate and tropical zones of the world, and is especially prevalent in this country in the South. It also occurs in the Northern States, and is a serious disease of greenhouse plants everywhere.

The author records about 480 species and varieties of plants subject to the attacks of this nematode, and describes the life cycle, conditions under which it multiplies, and how it attacks the plant. Under methods of control in greenhouses and seed beds the author describes sterilization by heating with steam, removal of infested soil, destruction of nematodes by freezing, thawing, and drying, and the use of formaldehyde. For the control of nematodes in the field more difficulty is experienced, but where perennial crops are to be planted, preliminary to setting them, the ground may be freed by the use of carbon bisulphid or flooding. Where these measures can not be used high fertilization and constant cultivation will help the plants to outgrow the trouble. Where the land is devoted to annual crops, keeping it free from vegetation for 2 years, planting nonsusceptible crops, heavy use of fertilizers, flooding the land for a period of several weeks, and protecting the infected land from washing by the erection of embankments, ditches, etc., are advised.

An extensive bibliography is appended.

A Sclerotinia on apple, J. B. Demaree (*Science, n. ser., 35 (1912), No. 889, pp. 77, 78*).—A description is given of apothecia of Sclerotinia found upon mummied apples in November, 1911. The fruiting bodies differed materially in some respects from those described by Aderhold as associated with *Monilia fructigena* on the apple, and the author presents contrasting characters showing that in nearly every respect the Sclerotinia described is smaller than that mentioned by the German investigators.

The author was unable to produce any growth from the ascospores; therefore there is no proof of any connection with a conidial form of Sclerotinia, but it is supposed to be the perfect form of the fungus causing the brown rot of apples in this country.

On the chloranthy of Prunus mume caused by Cæoma makinoi, S. Kusano (*Jour. Col. Agr. Imp. Univ. Tokyo, 2 (1911), No. 6, pp. 287–326, pls. 2, figs. 3*).—An account is given of the fungus *C. makinoi* and its action upon the host. The

fungus affects the young buds, causing a pronounced malformation of the organs concerned. The fungus is parasitic in the flower buds, and the stimulus exerted by the mycelium causes a modified development of the different organs. The extent of modification seems to depend on the stage of growth when parasitism is set up.

Recent studies on the chlorosis of grapes and the effect of mineral fertilizers, J. BERNÁSTKY (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 32, pp. 162–164*).—In continuation of his previous studies on the treatment of chlorosis (E. S. R., 21, p. 551), the author has paid special attention to the effect of different phosphates and phosphatic fertilizers.

The investigation as a whole shows the rôle of iron in relation to chlorosis to be insignificant, since the plant becomes chlorotic even in the presence of an abundance of iron when the medium is alkaline. The alkaline phosphates appeared to cause chlorosis, while the acid phosphates had a curative effect. It was also demonstrated that chlorosis is not caused by a lack of potash.

From a test of the phosphatic fertilizers, it appeared that the superphosphates have no effect on acid soils and that basic slag is of no value on alkaline soils. The author recommends the use of basic slag, first on acid soils, and secondly on neutral soils, and the use of superphosphate on lime soils where they are of value both for their content in phosphates and for their acid reaction.

Chlorosis and lime, G. PROVOST-DUMARCHAIS (*Jour. Agr. Prat., n. ser., 22 (1911), No. 46, pp. 616, 617*).—In a previous publication (E. S. R., 25, p. 849), the author described a probable relation between the downy mildew of grapes and chlorosis, and held that the fungus was favored in its development by a weakened condition of the stock which resulted in chlorotic growth.

In the present paper he calls attention to the fact that the American vines, which are resistant to phylloxera and consequently are much used as stock, are very subject to unfavorable proportions of lime in the soil. In many regions in France there is a high content of lime, and, as a result, chlorosis is very prevalent.

For preventing chlorosis, the author recommends watering about the roots with a solution of iron sulphate, spraying the leaves during the growing season, and during the dormant period washing the stems with a strong solution of iron sulphate.

On the propagation of downy mildew by wind, G. MONNEYRÈS (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 49, pp. 668, 669*).—The author calls attention to the probable rôle of winds in the distribution of the spores of the downy mildew, showing that the disease spreads rapidly in the direction of prevailing winds and that it is more severe when the wind blows strongly for a considerable time. This, he says, causes the turning of the leaves so that the spores find lodgment on the lower surfaces, where they can more readily attack the host plant.

American gooseberry mildew on red currant bushes (*Gard. Chron., 3. ser., 50 (1911), No. 1305, p. 473*).—It is stated that during the past summer in Cambridgeshire, England, at least 59 cases of gooseberry mildew (*Sphærotheca mors-uvæ*) have been reported on red currants. In every case the currant bushes were in the vicinity of mildewed gooseberry bushes, and judging from the previous absence of the fungus on currants it is believed that it has adapted itself to a host which hitherto has been practically immune.

On the red currant the mildew affects the stalks and blades of the leaves more severely than the stems, while on the gooseberry the reverse occurs. Perithecia were abundantly developed on the mildewed leaves of the currants, indicating that the fungus could live over to another season.

The control of the American gooseberry mildew, C. M. WILLIAMS (*Ann. Rpt. Quebec Soc. Protec. Plants [etc.], 3 (1910–11), pp. 80, 81*).—An account is given of a series of experiments in which lime-sulphur, potassium sulphid, and Bordeaux mixture were used for controlling the American gooseberry mildew (*Sphærotheca mors-uvæ*). The varieties attacked by this fungus are mostly European, and in some instances severe loss is occasioned.

The plats receiving the lime-sulphur gave the best growth and mildew was only slightly in evidence. Potassium sulphid was somewhat less satisfactory, and Bordeaux mixture proved a failure for the control of the fungus.

Banana and plantain disease, J. B. RORER (*West India Com. Circ., 26 (1911), No. 336, pp. 389–391*).—A somewhat detailed account is given of a disease of bananas and plantains due to *Bacillus musæ*, a technical description of which has been given elsewhere (E. S. R., 24, p. 250; 25, p. 148).

The new chestnut bark disease, I. C. WILLIAMS (*Science, n. ser., 34 (1911), No. 874, pp. 397–400*).—An account is given of the chestnut bark disease due to *Diaporthe parasitica* (E. S. R., 19, p. 250).

The fungus is thought to enter usually through wounds in the bark, broken twig ends, or insect tunnels, but the author states that numerous instances have been found where it penetrated through the lenticels of the bark. There have also been found some well-defined instances where yellow pustules were growing upon freshly exposed wood.

Some notes are given on the vitality of the fungus, the author stating that it has been found containing active fruiting bodies on unbarked chestnut rails that had been dried for more than a year. Specimens contained in moist cells for 37 months continued to produce pustules.

The author describes at some length the efforts that are being made in Pennsylvania to control this disease, $275,000 having been appropriated by the State for that purpose. In addition this Department has an appropriation of $5,000 for a study of the disease.

Diseases of the white pine, P. VUILLEMIN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 22, pp. 1497, 1498*).—Attention is called to the reported presence on white pines in some nurseries in France of the fungus *Hypoderma brachysporum*. The author states that he observed this fungus on the needles of white pine near Epinal as early as 1888. Nearby a number of vigorous white pines were growing which did not seem to be affected, and he doubts whether the fungus is a very active parasite.

He observed, while studying the Hypoderma, cankers caused by *Dasyscypha calycina* and also the fungus *Armellaria mellea* on the infected trees, and he thinks that all the species were present as a result of weakened growth due to unfavorable soil conditions.

Loranthus as a parasite on Hevea brasiliensis, E. BATESON (*Agr. Bul. Straits and Fed. Malay States, 10 (1911), No. 11, pp. 360, 361*).—Attention is called to the parasitism of Loranthus on Para rubber trees, and the author states that it also attacks casuarinas and mangosteens.

On the means for combating plant diseases, K. MÜLLER (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb., 1910, pp. 60–63*).—In continuance of previous investigations (E. S. R., 24, p. 745) the author reports as follows:

Sulfabion is now presented in a somewhat expensive form, is not sufficiently miscible with water, and does not adhere persistently to the plants. Comparisons with sulphur as to efficiency in combating Oïdium proved impracticable, as Oïdium did not appear except sparingly.

Cucasa, a rather expensive powder but convenient for use, requiring simply admixture with water, and offered as a defense against Peronospora, was tested with regard to the claim that it requires fewer applications than a Bordeaux

mixture. This claim was not sustained. Moreover, Cucasa was found to deteriorate rapidly with age.

A silver nitrate emulsion discovered in France was tested later in the year on a small scale in comparison with Bordeaux mixture with results so favorable as to warrant repetition on a larger scale.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The races of Indian rats, R. E. LLOYD (*Rec. Indian Mus., 3 (1909), No. 1, pp. 104, pls. 7, figs. 11*).—An inquiry supplementary to the investigation of plague, and dealing with the origin of races from sports.

Reproduction in the brown rat (Mus norwegicus), N. MILLER (*Amer. Nat., 45 (1911), No. 538, pp. 623–635, figs. 2*).—"The brown rat breeds in every month of the year. The gestation period is 23½ to 25½ days. The number of young per litter varies from 6 to 19 with an average of between 10 and 11. Five or 6 litters may be reared by a single pair in a year. . . . Brown rats in captivity eat almost 50 per cent of their young at birth. Most of the young eaten, if not all, are eaten by the females. Full growth is attained not under 18 months. Sexual maturity is reached at least by the end of the fourth month in both sexes."

The birds of North and Middle America, R. RIDGWAY (*U. S. Nat. Mus. Bul. 50, pt. 5, 1911, pp. XXIII+859, pls. 33*).—This part (E. S. R., 19, p. 251) deals with the birds of the families Pteroptochidæ or tapaculos, Formicariidæ or antbirds, Furnariidæ or ovenbirds, Dendrocolaptidæ or woodhewers, Trochilidæ or humming birds, Michopodidæ or swifts, and Trogonidæ or trogons.

The relation of birds to an insect outbreak in northern California during the spring and summer of 1911, H. C. BRYANT (*Condor, 13 (1911), No. 6, pp. 195–208, figs. 4*).—This is a report of investigations conducted during an outbreak of a plague of caterpillars of the nymphalid butterfly *Eugonia californica* which occurred in the northern counties of California, especially in Siskiyou County, during the spring and summer of 1911. The caterpillar feeds upon snow brush (*Ceanothus cordulatus*) or buck brush (*C. velutinus*).

Five species of birds were found to feed on *E. californica*, viz. the Brewer blackbird (*Euphagus cyanocephalus*), western meadowlark (*Sturnella neglecta*), western kingbird (*Tyrannus verticalis*), blue-fronted jay (*Cyanocitta stelleri frontalis*), and Say phoebe (*Sayornis sayus*). The Brewer blackbird was found to be the most efficient check both on account of numbers and food habits, taking 95 per cent of all the butterflies eaten by birds. An examination of 13 stomachs of the red-winged blackbird (*Agelaius phœniceus*, subspecies?) showed over 93 per cent of its food to be vegetable matter, thus bringing out the vast difference in food habits between this bird and the Brewer blackbird, 83 per cent of whose food was animal matter.

Eugonia californica in the butterfly stage, probably on account of its large size, was not eaten by any species of bird smaller than the Say phoebe. The smaller birds probably had a more intimate relation to the outbreak when the insect was in the larval and pupal stage.

"The data collected show of what value birds may be in the checking of an insect outbreak rather than their value in the prevention of an outbreak."

Entomology in the West Indies (*West Indian Bul., 11 (1911), No. 4, pp. 282–317*).—A summary of the entomological work undertaken by the Imperial Department of Agriculture from October 1, 1898, to March 31, 1911.

Nature sketches in Temperate America, J. L. HANCOCK (*Chicago, 1911, pp. XVIII+451, pls. 12, figs. 215; rev. in Auk, 28 (1911), No. 4, pp. 498, 499*).—Under sectional headings, the author deals with (1) Evolution and Natural

Selection (pp. 1–24); (2) Adaptations in Animals and Plants, with examples (pp. 25–64); (3) Protective Resemblance, with examples (pp. 65–114); (4) Mimicry, with examples (pp. 115–133); (5) Warning Colors, Terrifying Markings, and other Protective Devices, with examples (pp. 135–164); (6) Animal Behavior, with examples (pp. 165–267); (7) General Observations and Sketches Afield, with examples (pp. 269–314); and (8) Ecology—Interpretation of Environment as Exemplified in the Orthoptera (pp. 315–433).

The Jola or Deccan grasshopper (Colemania sphenarioides), L. C. Coleman (*Dept. Agr. Mysore, Ent. Bul. 2, 1911, pp. 43, pls. 10, figs. 8; abs. in Agr. Jour. India, 6 (1911), No. 4, pp. 442–444, pl. 1, fig. 1*).—This bulletin deals with the wingless grasshopper *C. sphenarioides*, a native of the south of India, which has recently become an important crop pest, especially of cultivated cereals.

A résumé of the locust situation, D. B. Mackie (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 7, pp. 344–348*).—This paper records conditions relative to the occurrence of locusts in the Philippine Islands.

The bacteriology of the cockroach, C. C. Morrell (*Brit. Med. Jour., 1911, No. 2658, pp. 1531, 1532*).—Experiments conducted with *Blatta germanica*, here reported, are thought to prove that by contamination with its feces the common cockroach "is able to, and may possibly, play a small part in the dissemination of tuberculosis and in the transmission of pyogenic organisms; that the insect is in all probability an active agent in the souring of milk kept in kitchens and larders; and that it is undoubtedly a very important factor in the distribution of molds to food and to numerous other articles, especially when they are kept in dark cupboards and cellars where cockroaches abound."

Thrips flava as a carnation pest in greenhouses, L. Fulmek (*Ztschr. Pflanzenkrank., 21 (1911), No. 5, pp. 276–280, figs. 3*).—The author describes an injury to carnations caused by *T. flava* that was observed in greenhouses in Lower Austria during 1910. White spots on the petals, particularly noticeable on the dark red varieties, were caused by the feeding of the thrips, many blooms being rendered unfit for sale.

Notes on the use of tobacco and tobacco extracts in combating the pest are included in the account.

Papers on cereal and forage insects.—Chinch-bug investigations west of the Mississippi River, E. O. G. Kelly and T. H. Parks (*U. S. Dept. Agr., Bur. Ent. Bul. 95, pt. 3, pp. 23–52, pls. 2, figs. 5*).—This paper has been prepared for the purpose of giving farmers information relative to the habits of this insect and the most effective methods of combating it. Field observations of this pest in Kansas, Oklahoma, and Missouri, on which it is based, were begun in the spring of 1907 and continued until March, 1911.

The authors discuss the distribution of the chinch bug, its migration, status of the chinch-bug problem in Kansas, Missouri, and Oklahoma, southern Kansas and northern Oklahoma in 1910 and in Kansas in 1911, its hibernation, preventive measures, remedial measures, unsatisfactory remedial measures, plowing under infested crops, and parasitic fungi.

"Injuries due to the chinch bug west of the Mississippi River are chiefly confined to the States east of the Rocky Mountains where wheat and corn are extensively grown, the most serious outbreaks during 1909 and 1910 occurring in southern Kansas and northern Oklahoma. There are 2 generations each year, one during the spring, which attacks the wheat and corn, and one during the summer which develops on the corn and hibernates. These last pass the winter as adults, and in the States west of the Mississippi River prefer for hibernation the dense clumps of red sedge grass in which they collect in the fall. Very few survive the winter in fallen ears or stalks of corn during severe cold winters, but may survive a mild winter. . . . During the severe

winter of 1909 and 1910 about 20 per cent of the bugs died normally in the clumps of red sedge grass, where they hibernate.

"Experiments in Kansas made during the winter of 1909–10 showed that as high as 75 per cent of the hibernating chinch bugs could be killed by burning this grass. The best time to burn is in the fall, when the grass is as dry as possible. It is not necessary that the flame come in actual contact with the bugs. The effectiveness of the burning is almost entirely dependent upon the cooperation of the farmers in infested localities. Neglect to destroy chinch bugs collected in these grasses will often result in serious injury, if not indeed a complete destruction of wheat, corn, cane, and kafir. Next to burning, the dust and coal-tar barriers are the most effective remedies, and should be used while the bugs are migrating from wheat to corn. These barriers must be properly made, and demand constant attention to be of any value. Many bugs can be killed while massed on the first rows of corn by applying a torch or spraying with kerosene emulsion or proprietary spraying materials. Plowing under infested crops is not recommended unless the work is done very thoroughly and followed by a crop not susceptible to chinch-bug attack. Barriers made of piles of green corn are of no value, and are not recommended. The white fungus (*Sporotrichum globuliferum*) can not be depended upon to exterminate the chinch bugs. This fungus is very dependent upon moist weather conditions for its rapid development and diffusion. . . . Attempts at artificial introductions of the fungus in the fields have so frequently resulted in complete failures that this method is not recommended."

Piesma capitata as an enemy of sugar beets in Silesia, GROSSER (*Abs. in Prakt. Bl. Pflanzenbau u. Schutz, 8 (1910), No. 12, p. 156; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 2, pp. 449, 450*).—The tingitid is reported to be the cause of curly top of sugar beets in Silesia. As a remedy it is recommended that all weeds in the vicinity which attract the pest, especially species of Chenopodiaceæ, be destroyed.

Aleyrodidæ of economic importance, G. E. BODKIN (*Jour. Bd. Agr. Brit. Guiana, 5 (1911), No. 2, pp. 83–86, pls. 9*).—The author describes a species of Aleyrodes which has been observed infesting species of Anona in Georgetown and cassava plants on the East Coast, where it has been the source of considerable damage. It is stated that when large numbers of Aleyrodidæ appear on a plant a chalcidid parasite frequently attacks them.

Pernicious scale (*Agr. Jour. Union So. Africa, 2 (1911), No. 4, pp. 488, 489*).—It is stated that the government is attempting to eradicate the San José scale, recently discovered in a Pretoria nursery and from which it is thought to have been spread for several years on infested fruit trees and roses.

Studies of comparative lepidopterology, C. OBERTHÜR (*Études de Lépidoptérologie Comparée. Rennes, 1904, No. 1, pp. 77, pls. 6; 1906, No. 2, pp. 43, pls. 3; 1909, No. 3, pp. 415, pls. 25; 1910, No. 4, pp. 691, pls. 24*).—Among the subjects considered are dimorphism, mutation, sphingid hybrids, notes on the French and Algerian species, etc. Notes on the myrmecophilous lycenid caterpillars, by H. Viehmeyer (pp. 342–349) and a list of animals associated with ants, by C. Janet (pp. 349–417) are included.

The work is illustrated by colored plates.

The willow caterpillar (Clisiocampa azteca), J. R. INDA (*Estac. Agr. Cent. [Mexico] Bol. 63, 1911, pp. 16, pls. 4*).—An account is given of the life history, habits, and natural enemies of, and remedial measures for, *C. azteca*, which during March and April completely defoliates willows (*Salix babilonica* and *S. pringlei*), in Mexico City.

Mimosa thorn caterpillar (*Rhodesia Agr. Jour., 9 (1911), No. 1, pp. 81–84, pls. 3*).—The Mimosa thorn caterpillar (*Haplopacha punctifascia*) is said to

be a serious enemy of the wild thorny Acacia, which is prevalent on the higher veld of Matabeleland, and in some seasons attains the proportions of a veritable plague in and around Bulawayo.

The wax moth, T. B. FLETCHER (*Agr. Jour. India, 6 (1911), No. 4, pp. 399–404, pl. 1*).—Notes on the life history of the wax or bee moth (*Galleria mellonella*) as recorded at the Pusa insectary are included in this general account.

Codling moth control, G. QUINN (*Jour. Dept. Agr. So. Aust., 15 (1911), No. 3, pp. 227–235*).—A report of tests of the comparative value of several brands of lead arsenate, all of which proved satisfactory.

Notes on the larvæ of Toxorhynchites immisericors, C. A. PAIVA (*Rec. Indian Mus., 5 (1910), No. 3, pp. 187–190*).—The author reports that in the course of 1 night more than 100 Stegomyia larvæ were destroyed by 3 larvæ of *T. immisericors*. When confined to small receptacles of water these carnivorous larvæ will feed upon any mosquito larvæ without discrimination, except that apparently they do not begin to eat one another until other supplies are running short. Since the yellow fever mosquito is very common in vessels about Calcutta, the part played by *T. immisericors* in its destruction is of considerable importance.

A monograph of the anopheline mosquitoes of India, S. P. JAMES and W. G. LISTON (*Calcutta, 1911, 2. ed., rev. and enl., pp. VIII+128, pls. 32, figs. 17; rev. in Nature [London], 87 (1911), No. 2190, p. 511*).—A second rewritten and enlarged edition of this monograph.

Part 1 (pp. 1–58) consists of a general account of mosquitoes, including a list of the described or named species of the anophelines of India, and instructions for the collection, mounting, and examination of anopheline mosquitoes and their larvæ, and the classification and identification of Indian anophelines. Part 2 (pp. 59–128) presents systematic descriptions of the anopheline mosquitoes found in India.

The life history of the Phlebotomus, P. J. MARETT (*Jour. Roy. Army Med. Corps, 17 (1911), No. 1, pp. 13–29, pl. 1*).—This subject, a preliminary account of which has been previously noted (E. S. R., 25, p. 56), is taken up under the following headings: Breeding experiments, life history, egg, larva, pupa, imago, preventive measures for breeding, and preventive measures for lowering the incidence of fever.

Life histories of Syrphidæ, II, C. L. METCALF (*Ohio Nat., 12 (1911), No. 1, pp. 397–405, figs. 18*).—In this second paper (E. S. R., 25, p. 360), the author deals with *Paragus bicolor* and *P. tibialis*.

Observations of *P. bicolor* indicate that there are 2 distinct generations annually, one appearing in the spring on dates varying from the middle of May to the middle of June, or a little later in different parts of Ohio; the second appearing in August and possibly later. Both species were found to be parasitized by a small ichneumonid (*Bassus* sp.), which oviposits through the skin of the larvæ.

Fruit and pumpkin flies, E. E. GREEN (*Trop. Agr. and Mag. Ceylon Agr. Soc., 37 (1911), No. 3, pp. 240–242, fig. 1*).—The author reports having found 6 species of trypetid fruit flies in Ceylon, 5 representing the genus Dacus and 1 the genus Ceratitis. Brief notes on observations of their habits are presented.

Two species of Diptera of the genus Drosophila, H. R. NISWONGER (*Ohio Nat., 11 (1911), No. 8, pp. 374–377, figs. 8*).—Biological and descriptive notes on *Drosophila busckii* and *D. funebris* are presented.

The fleas infesting domestic animals, K. WOLFFHÜGEL (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), Nos. 2–3, pp. 218–236; 4–5, pp. 354–382, figs.*

17).—A summarized account is given of the fleas attacking domestic animals, together with a bibliography of the more important literature on the subject.

The origin of the pigment and the color pattern in the elytra of the Colorado potato beetle (Leptinotarsa decemlineata), R. A. GORTNER (*Amer. Nat., 45 (1911), No. 540, pp. 743–755*).—"It has been shown that Tower's statements[1] as to the nature of the cuticula pigments, and the methods of pigment formation, are based upon wrong interpretations of his results, and upon errors in the application of chemical data. The cuticula pigment is not an azo compound but belongs to the melanins. The pigmentation of the elytron of the Colorado potato beetle is produced by the interaction of an oxidizing enzym of the tyrosinase type, and an oxidizable chromogen. The color pattern is caused by the localized secretion of the chromogen."

Calosoma sycophanta: Its life history, behavior, and successful colonization in New England, A. F. BURGESS (*U. S. Dept. Agr., Bur. Ent. Bul. 101, pp. 94, pls. 9, figs. 22*).—This carabid beetle is one of the most important of the natural enemies of the gipsy and brown-tail moths. It was first successfully imported into this country from Italy and Switzerland in 1906, during which year 693 specimens, together with 289 specimens of *C. inquisitor*, were received at the Gipsy Moth Parasite Laboratory. Since that time specimens have been imported each year, a total of 4,046 *C. sycophanta* having been received up to the close of 1910.

Accounts are first given of methods of packing predaceous beetles for shipment, the European distribution of *C. sycophanta* and hosts attacked, and the plan of work at the laboratory. A detailed account of the life history, habits, methods of rearing, etc., of *C. sycophanta* follows.

The longevity of the adults rendered the investigations somewhat difficult, as is evidenced by the fact that nearly one-half of the beetles reared from eggs in 1907 that emerged from the earth in the spring of 1908 survived the summers of 1908 and 1909 and went into hibernation in the fall. The eggs are deposited in the earth, the time spent in the egg stage varying from 3 to 10 days, depending largely upon the temperature. The average length of time spent in the egg stage, based on the hatching each month during the summer, was: May, 7 days; June, 5.2 days; July, 4.4 days; and August, 4 days. The larvæ molt twice, the duration of time between the molts being influenced greatly by high temperatures and food supply. Records kept of 9 larvæ that developed from eggs laid by beetles that emerged normally show the average length of time to be 2 days for the first stage, 3 days for the second, and 9 days for the third, a total of 14 days.

The larvæ of this species secure food by searching for the caterpillars and pupæ of various lepidopterous insects. In addition to feeding on the ground they are able to climb trees and devour their prey upon the trunks or branches. The larvæ "appear to feed both by day and night, but their activity in this direction is greatly stimulated if the weather is hot. As a rule the caterpillars are attacked from the side or in the middle of the back, and if they are hairy specimens the favorite place seems to be between the segments where the larvæ can more readily pierce the integument with their sharp mandibles. Newly hatched larvæ of *C. sycophanta* are able successfully to combat equally well all caterpillars regardless of size. After the body wall of a caterpillar has been cut, the Calosoma larvæ feed upon the juices and apparently devour a large amount of the fat body of their prey. The entire internal tissues of the caterpillars are seldom eaten, and many specimens are injured to such an extent that they eventually die, and thus more caterpillars are prevented from transforming

[1] Univ. Chicago Decen. Pubs., 10 (1903), p. 33.

than are actually eaten. The pupæ of Lepidoptera, especially those which are destitute of a cocoon, suffer greatly from the inroads of the larvæ of this insect. In fact, so far as the gipsy moth is concerned, it is probable that the destruction of the pupæ is fully as great as that of the larvæ." In field colonies the larvæ of *C. sycophanta* have been found attacking and killing adult females of the gipsy moth. They apparently prefer large caterpillars or pupæ which have a considerable amount of fatty matter in the body cavity.

Larvæ observed in May, 1908, required an average of 28 days to complete their feeding while in June only 14 days were necessary, the number of caterpillars consumed in May being considerably greater than in June. It was found impossible to induce the beetles of this genus to depart from their fixed habit of developing only one generation in a single year.

The distance which the larvæ of this species penetrate the ground for the purpose of forming their pupal chambers varies greatly, and seems to be governed largely by the character of the soil and the amount of moisture which it contains. A record of 20 Calosoma pupæ—12 males and 8 females—which made cavities, during the fall of 1908 and 1909, shows that they penetrated from 4 to 8 in. below the surface in outdoor cages. In observations of 8 larvæ in 1910 the length of time from cessation of feeding until pupation actually took place was found to be from 7 to 15 days, the average time being 10½ days. During the same year, the time spent in the pupal stage, based on records of 10 pupæ, ranged from 12 to 15 days, the average being 13.4 days. The food of the adult beetles is similar to that of the larvæ. The highest number of eggs laid in a single season by a female was 653, the next highest number recorded being 514. The average for 144 females ovipositing during 1908, 1909, and 1910 was 128.4 eggs. The colonization work is described at length.

The data presented show conclusively that this beneficial species is firmly established in eastern Massachusetts, and although in most cases some traces of the insect's presence have been found the year following planting, it takes 3 years or more before they are sufficiently abundant to attract attention. "Its ability to survive and reproduce in New England has been clearly demonstrated when it is stated that as a result of the planting of 13 adult and 14 larval colonies from 1906 to 1908, the presence of the beetle was found over an area of about 9½ square miles in the summer of 1909. During that year 3 adult and 29 larval colonies were liberated and in the summer of 1910 the insects were found scattered over about 106½ square miles in Massachusetts. The aggregate rate of multiplication and dispersion increases with the age of the colonies. Future observations will show the precise value of this insect as an enemy of the gipsy moth."

The blue pine Polygraphus bark borer (P. major), E. P. Stebbing ([*Indian Forest Dept.*], *Ser. Forest Zool., Leaflet, 1910, No. 5, pp. 7, figs. 6*).—An account of the life history and habits of this beetle, its natural enemies, and remedial measures.

The cotton fields invaded, W. E. Hinds (*N. Y. Tribune Farmer, 10 (1911), No. 514, p. 18*).—The exceptionally abundant occurrence of the cotton leaf worm resulted in severe defoliation of cotton in Alabama. The author points out the many advantages that powdered arsenate of lead has over Paris green in combating this pest.

A weevil enemy of Caravonica cotton, H. Morstatt (*Pflanzer, 7 (1911), No. 4, pp. 227-230, pl. 1*).—This is a discussion of a weevil enemy of cotton that was first observed by Zimmermann[1] in Morogoro, German East Africa, in October, 1910. The habits of this weevil and the injury caused appear to be much similar to those of the Mexican cotton boll weevil.

[1] Pflanzer, 6 (1910), p. 271.

Weevil and dry wheat, T. B. FLETCHER (*Agr. Jour. India, 6 (1911), No. 4, pp. 333–343, pl. 1*).—It is stated that stored wheat containing less than 8 per cent of moisture is immune from attack by weevils and that any weevils that may gain access to it are soon killed off. Wheat when threshed contains about 8 per cent of moisture, but in India this may be reduced to about 4 per cent by exposure to the sun in April and May.

A list of the type species of the genera and subgenera of Formicidæ, W. M. WHEELER (*Ann. N. Y. Acad. Sci., 21 (1911), pp. 157–175*).—This list of the genera and subgenera, both living and fossil, is believed to be complete to June, 1911.

Hymenoptera.—Family Ichneumonidæ, G. V. SZÉPLIGETI (*P. Wytsman's Genera Insectorum. Brussels, 1911, No. 114, pp. 100, pls. 2*).—This fascicle of the series edited by P. Wytsman deals with the Mesochoroidæ, which includes the subfamilies Limnerinæ, Mesochorinæ, Adelognathinæ, Plectiscinæ, Vanchinæ, Neomesochorinæ, Megacerinæ, and Paniscinæ.

Descriptions of six new genera and thirty-one species of Ichneumon flies, H. L. VIERECK (*Proc. U. S. Nat. Mus., 40 (1911), pp. 173–196*).—Among the species of economic importance from the family Braconidæ are: *Apanteles (Protapanteles) chrysippi*, reared from larvæ of *Danais chrysippus* in Portuguese East Africa; *A. griffini*, reported to have overcome a scourge of cutworms at Quogue, N. Y.; *A. (Pseudapanteles) etiellæ*, reared from *Etiella schisticolor*, at Pullman, Wash.; *Diachasma crawfordi*, taken while stinging maggot-infested mangoes at Cuernavaca, Mexico, and probably a parasite of *Anastrepha ludens; Hormiopterus graciliformus*, reared from a eurytomid in Agropyron, at Wellington, Kans.; *Macrocentrus (Amicroplus) crambivorus*, reared from Crambus larvæ at Corry, Pa.; and *Microplitis melianæ*, reared from *Meliana albilinea*, at Grand River, Iowa. From the family Ichneumonidæ are described *Ancmpheres diaphaniæ*, reared from pupal cases of *Diaphania hyalinata*, at Raleigh, N. C.; *Cremastus hymeniæ*, reared from *Hymenia fascialis*, Oahu, Hawaiian Islands; *Limnerium (Campoletis) prodeniæ*, reared from *Prodenia ornithogalli*, at Mount Washington, Ohio; *Mesochorus infernalis*, reared at Santa Maria, Tex., in connection with *Apanteles (Protapanteles) flaviconchæ*, which is probably its host; and *Mesochorus nigrisignus*, from Grand River, Iowa, thought to be parasitic on *Microplitis melianæ*.

Descriptions of one new genus and eight new species of Ichneumon flies, H. L. VIERECK (*Proc. U. S. Nat. Mus., 40 (1911), pp. 475–480*).—The new species here described that are of economic importance include *Apanteles lacteicolor*, bred from *Euproctis chrysorrhœa* from Europe, and *Pimpla porthetriæ*, bred from *Porthetria dispar* from Japan. The genus Cyanopteridea is erected to replace Cyanopterus of Szepligeti, *C. (Iphiaulax) clypeolus* being the type species.

Descriptions of new Hymenoptera, II, J. C. CRAWFORD (*Proc. U. S. Nat. Mus., 40 (1911), pp. 439–449*).—This second paper (E. S. R., 26, p. 63) presents descriptions of 15 new species. Among those of economic importance are *Telenomus benefactor*, reared from the eggs of *Tabanus tæniola* at Bebelein, Egyptian Soudan; *Telenomus kingi*, reared from the eggs of *Tabanus kingi* at Kohr Arbat, Egyptian Soudan; *Telenomus gowdeyi*, reared from the eggs of *Anaphe infracta* at Entebbe, Uganda; *Habrocytus piercei*, reared from *Anthonomus grandis* at Tallulah, La.; *Zatropis deuterus*, reared from a cecidomyiid larva injuring cotton in Antigua, British West Indies; *Pleurotropis telenomi*, reared from the eggs of *Anaphe infracta*, together with *Telenomus gowdeyi*, on which it appears to be a secondary parasite, at Entebbe, Uganda; *Horismenus apantelivorus* and *H. cockerelli*, both reared from *Apanteles* sp. at Kingston, Jamaica; *Tetrastichus antiguensis*, reared from *C. floridensis* at Antigua, West

Indies; *Tetrastichus ovivorus*, reared from eggs of *Conchyloctenia parummaculata*, at Entebbe, Uganda; and *Sympiesis felti*, reared from *Agromyza melanopyga*.

On Cœlopisthia nematicida, a chalcid parasite of the large larch sawfly, Lygæonematus erichsonii, C. G. HEWITT (*Canad. Ent., 43 (1911), No. 9, pp. 297–303, figs. 4*).—In observations made on the development of this chalcidid parasite, it was found that in the September and October broods the eggs, which are laid on the host larvæ inside the cocoons, hatch in from 2 to 3 days. The larvæ become full grown in from 10 to 12 days and the adults may emerge about 23 days after the eggs are deposited. The parasite feeds externally and hibernates as a mature larva inside the cocoon of the host. A number of broods of the parasite occurs annually.

The root borer and its parasite, H. W. DAVEY (*Jour. Dept. Agr. Victoria, 9 (1911), No. 7, pp. 451–455, fig. 1*).—This paper includes a technical description, by H. L. Viereck of this Department, of a new braconid parasite (*Perilitus leptopsi*) of the apple root borer (*Leptops hopei*). In many districts of Victoria this borer is one of the most formidable enemies of the fruit industry.

The number of parasitic larvæ contained in a beetle varies, an average of 25 having been found during the past season.

On the Hymenoptera of the Georgetown Museum, British Guiana, P. CAMERON (*Timehri, Brit. Guiana, 3. ser., 1 (1911), No. 3, pp. 306–330*).—This second part of the paper previously noted (E. S. R., 26, p. 63), includes descriptions of numerous new genera and species of Braconidæ and Tenthredinidæ.

The occurrence of Hæmaphysalis punctata on cattle in the District of Apenrade, P. KNUTH (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 48, pp. 865–868, figs. 12*).—The author records the occurrence of this tick in the District of Apenrade, which lies in the northern part of Schleswig-Holstein. This is the first record of the occurrence of this important species in Germany, *Ixodes ricinus* being the one which commonly transmits bovine piroplasmosis in that country.

The hothouse milliped as a new genus, O. F. COOK (*Proc. U. S. Nat. Mus., 40 (1911), pp. 625–631*).—Fleshy fungi are said to be the only living plants that are regularly eaten by millipeds. "Some of the native millipeds in the vicinity of Washington, D. C., feed to a considerable extent upon the local species of Amanita, Russula, and Lactarius. Damage is sometimes done to other plants when millipeds gain access to wounded surfaces of roots or cuttings. Healing may be prevented or cuttings may be kept from rooting by continual scraping of the exposed surfaces."

The genus Oxidus is erected for *Fontaria gracilis*, a species widely distributed in the Tropics and in hothouses.

The rubber slug (Mariælla dussumieri), E. E. GREEN (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 22, pp. 337–343, pl. 1*).—This slug, which occurs commonly in both cultivated and uncultivated land to an elevation of at least 2,000 ft. and probably higher, has attracted attention as a pest only in connection with the rubber industry. It first came into notice in 1905 through frequenting the recently tapped Hevea trees and imbibing the latex as it oozed from the cuts. This habit results in an appreciable diminution of the scrap rubber that can be collected after tapping.

About two new hop pests, B. WAHL (*Wiener Landw. Ztg., 61 (1911), No. 36, p. 416*).—*Hydroecia micacea* and an undetermined cecidomyiid are mentioned as enemies of the hop.

Insect enemies and diseases of the tomato in Mexico, R. RAMÍREZ and J. R. INDA (*Estac. Agr. Cent. [Mexico] Bol. 56, 1911, pp. 46, pls. 16, figs. 11*).—

An account of the more important insect enemies and fungus diseases of the tomato in Mexico with remedial measures therefor.

Enemies of kapok (*Philippine Agr. Rev.* [*English Ed.*], *3* (*1910*), *No. 2, p. 93; Trop. Agr. and Mag. Ceylon Agr. Soc., 35* (*1910*), *No. 6, p. 503*).—The beetle *Batocera hector*, though rare, is the most important insect enemy of kapok in Java. Other pests mentioned as occasionally attacking the crop are *Earias fabia*, *Dysdercus cingulatus*, and *Helopeltis* sp. The greatest injury is caused by the feeding of bats upon the young fruit.

Mango insects, W. V. Tower (*Porto Rico Prog., 2* (*1911*), *No. 1, pp. 85–92*).—A paper presented before the Porto Rican Horticultural Society, in which the author briefly discusses the insects attacking the native mango that may attack imported varieties as they become more extensively grown.

The mango fruit fly is the most important pest, being especially fond of one variety that is grown on the island and practically ruining all its fruit. It has also been found at times infesting some of the choice imported varieties grown at the federal experiment station. There are, however, a number of native mangoes which seem to be immune to its attack.

Insect enemies of Theobroma cacao on the island of St. Thomas, M. S. Camara and A. Cannas Mendes (*Rev. in Ztschr. Pflanzenkrank., 21* (*1911*), *No. 5, p. 310*).—The insects mentioned as attacking cacao are *Aræocerus fasciculatus*, *Xyleborus perforans*, *Helopeltis* sp., and *Ephestia elutella*.

Preliminary notes on some insects affecting the coconut palm, F. W. Urich and P. L. Guppy (*Bd. Agr. Trinidad Circ. 5, 1911, pp. 30, pls. 3*).—The insects briefly noted are the palm weevil (*Rhynchophorus palmarum*), the small weevil borer (*Metamasius hemipterus decoratus*), the coconut Sphenophorus, the bearded weevil (*Rhina barbirostris*), 5 species of Coccidæ, the coconut butterfly (*Brassolis sophoræ*), the coconut Saturnia moth, and the rhinoceros beetle (*Strategus anachoreta*).

Insects destructive to books, W. R. Reinick (*Amer. Jour. Pharm., 83* (*1911*), *No. 11, pp. 503–515, figs. 2*).—A second contribution on the subject (E. S. R., 24, p. 752).

The use of soap to retard the settling of certain arsenicals, J. R. Parker (*Montana Sta. Bul. 86, pp. 35–45, fig. 1*).—Laboratory tests made to determine the effect of soap on the settling of arsenate of lead and arsenite of zinc are here reported, of which the following is a summary:

"The addition of common laundry soap, at the rate of 2 bars to 50 gal., to an arsenate of lead mixture retards the settling of the arsenate of lead, only half as much settling out of a soap mixture in 15 minutes as settled out of a nonsoap mixture in the same length of time. The amount that settled out of the soap mixture in 5 hours was the same as that which settled out of a nonsoap mixture in 30 minutes. Above a certain quantity, the amount of soap used appears to have little influence upon the amount of settling. Two bars to 50 gal. is about the least that can be used, and in practical work it would be safer to use 3 bars to 50 gal. Whale-oil soap gave slightly better results than the more expensive laundry soap. When mixed with soap there was little difference in the amount of settling in the 4 brands of arsenate of lead that were tried.

"The effect of soap upon the settling out of arsenite of zinc is even more striking than the effect upon arsenate of lead, more arsenite of zinc settling out of a nonsoap mixture in 15 minutes than out of a soap mixture in 15 hours.

"By ordinary methods of applying arsenate of lead with a knapsack sprayer it was found that the distribution of lead was not uniform and that a surprisingly large amount (64.36 per cent) was left in the bottom of the spray can. By very careful methods of mixing and application slightly better results were

obtained, but a far too large amount (55.45 per cent) was left in the bottom of the spray can. By the addition of soap at the rate of 2 bars to 50 gal. a more even distribution of arsenate of lead was secured and the amount left in the bottom of the spray can was reduced to about 25 per cent."

FOODS—HUMAN NUTRITION.

Treatise on the sophistication and adulteration of food materials, A. VILLIERS, E. COLLIN, and M. FAYOLLE (*Traité des Falsifications et Altérations des Substances Alimentaires. Paris, 1911, vols. 1, pp. VIII+448, figs. 83; 2, pp. 417, figs. 277; 3, pp. 395, figs. 206; 4, pp. 351, figs. 34; 5, pp. 343, figs. 191; 6, pp. 880*).—These volumes constitute an exhaustive treatise on the microscopical, physical, and chemical examination of foods and of condiments and beverages, and a summary of legislation pertaining to the subject. The volumes dealing with the examination and analysis of foods constitute a digest of data on these subjects. The majority of the botanical descriptions and many of the laboratory methods were contributed by the authors.

Volume 1 treats of waters, beverages, and alcoholic beverages; volume 2, the principal foods and condiments; volume 3, sugar and similar foods; stimulants; volume 4, dairy products and fat; volume 5, starchy foods, coloring materials, and preservatives; and volume 6, legislation and official documents.

Pure foods—their adulteration, nutritive value, and cost, J. C. OLSEN (*Boston and New York, 1911, pp. VII+210, pl. 1, figs. 29*).—It has been the author's purpose to prepare a handbook suitable for the needs of teachers and students of domestic science.

The mycology of food industries—an introductory text-book, A. KOSSOWICZ (*Einführung in die Mykologie der Nahrungsmittelgewerbe. Berlin, 1911, pp. VIII+138, pls. 5, figs. 21*).—The author deals with such general topics as the micro-flora of foodstuffs, the cultivation of micro-organisms, and the preservation of foods, and discusses specifically the spoiling and preservation of milk and butter, and meat, eggs, vegetables, and fruit, the bakery goods, sugar making, and animal feeding stuffs.

A bibliography is appended to the volume and a full index provided.

The purin content of foods, K. M. VOGEL (*München. Med. Wchnschr., 58 (1911), No. 46, pp. 2433, 2434*).—The author reports his determinations of the purin content of a number of foods in comparison with similar data reported by other investigators. Some of the material he examined was of American origin.

Changes in frozen and cold storage meat, J. E. RICHELET (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 8 (1911), pp. 71–88*).—The author has studied brown and black spot, "bonestink," and parasitic affections of frozen and cold-storage meat.

A study of the neck and tail vertebræ of farm animals and related mammals, and the use of such data for forensic and meat inspection purposes, H. KNOLLE (*Beiträge zur Kenntnis der Hals- und Schwanzwirbel der Haussäuger und ihnen Verwandten Arten für Forensische und Fleischbeschauzwecke. Inaug. Diss., Univ. Bern, 1911, pp. 26, pls. 13*).—The results of histological studies are reported, the text being supplemented by a large number of drawings.

The nutritive value of buffalo flesh as compared with beef, G. MAGINI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), 11, No. 1, pp. 40–46, pl. 1; Clin. Vet. [Milan], Rass. Pol. Sanit. e Ig., 34 (1911), No. 20–21, pp. 881–889, pl. 1*).—The data summarized led the author to conclude that buffalo flesh was superior to beef in nutritive value. The 2 sorts of meat were also compared with reference to their structure.

On certain changes in the composition of the nitrogenous constituents of meat extracts, A. M. WRIGHT (*Jour. Soc. Chem. Indus., 30 (1911), No. 20, pp. 1197, 1198*).—The author has studied the character and extent of the changes which meat extract undergoes during the process of manufacture and compared the composition of extract concentrated in an open pan and that concentrated under partial vacuum, with the original liquor.

"As but very small amounts of peptone-like bodies are present in vacuum-concentrated extract, and but little change in the composition of the nitrogenous bodies is found, it is probable that the prolonged action of heat on the nitrogenous material in the presence of the normal flesh acids and salts, the amounts of which increase as the evaporation proceeds, is the cause of the marked change in composition found in the open pan concentrated extract. The so-called 'burned' flavor, sometimes noticed in meat extracts, is doubtless due to the same cause, for in vacuum concentrated extract no such undesirable flavor is noted."

The paper is followed by a discussion.

The food value of sea mussels, I. A. FIELD (*U. S. Dept. Com. and Labor, Bur. Fisheries Bul., 29 (1909), pp. 85–128, pls. 8, figs. 2*).—A fuller account of investigations previously noted (E. S. R., 25, p. 163).

The baking qualities of flour as influenced by certain chemical substances, milling by-products, and germination of the wheat, J. T. WILLARD and C. O. SWANSON (*Trans. Kans. Acad. Sci., 23–24 (1909–10), pp. 201–207*).—The experiments showed that unextracted bran caused a deterioration in the loaf with respect to both volume and texture, as compared with a check test in which starch equal in weight to the bran was added. Extracted bran exercised a less marked effect on loaf texture, while the volume exceeded that of a loaf in which starch was used. The loaf in which the extract from 40 gm. of bran was used was best of all.

On the whole, extracts derived from wheat scourings were undesirable. The doughs produced were sticky, the bad effects being the more pronounced the greater the quantity of extract.

When peptones in amounts from 0.1 to 1 gm. were added little effect was observed, but larger quantities affected both texture and volume unfavorably and there was a decided stickiness in the dough. Glycocoll was very pronounced in its effects, producing a dough which was sticky, runny, and stringy, resembling that made from flour from badly germinated wheat. The loaf volume was decidedly reduced and the texture impaired. Leucin exercised similar though less pronounced effects and caused the development of a very disagreeable odor. Aspartic acid had little effect but was beneficial rather than otherwise. Asparagin was injurious in its effect. "While it caused a shortening of the time of rising, probably by a stimulation of the growth of the yeast, it weakened the gluten, thus decreasing the oven expansion and loaf volume. Similar effects are observed with flour from germinated wheat, and asparagin is well known as one of the products of the proteid metabolism accompanying germination."

Of the ammonium salts tried ammonium chlorid exercised so marked an effect that the quantities used were reduced to a minimum of 0.025 gm. This amount and quantities up to at least 16 times as much exercised a decidedly beneficial effect on texture and loaf volume, the salt apparently assisting the growth of the yeast, since the period of rising was shortened. Ammonium acetate had a similar though less marked effect. In larger amounts it lowered the quality of the loaf with respect to texture. Ammonium tartrate and ammonium phosphate exercised very slight effects. Sodium bicarbonate was distinctly detrimental, increasing the time of rising and diminishing the volume

of the loaf. The results obtained with sodium phosphate, sodium formate, and potassium nitrate are not commented upon.

"On the whole, it is evident that chemical substances in many cases have distinct, and in some cases very pronounced, effects upon the baking qualities of flour, and it is believed that a field has been opened that will repay further working. It is highly probable that the differences in the baking quality of flours are due to small differences in their content of these and similar substances as much as to their differences in composition in respect to the chief constituents."

Tests were also made in which flour from germinated wheat was mixed with sound flour, and, as was to be expected, since germination produces amino compounds, it was found that the germinated flour exercised an unfavorable effect upon the loaf. In the case of a sample of wheat which had germinated for 1 day and was then dried and heated in a steam bath for 2 days the bad effects were particularly noticeable. In a second series of tests in which flour from badly germinated wheat was mixed with standard flour the deleterious effects were strongly manifested, "even when only 1/30 of the mixture was flour from such wheat. With larger amounts the product showed that the mixtures were wholly unfit for bread making. The evil effects of mixing wheat damaged by germination with sound wheat were brought out for the first time by these experiments. Such wheat may be manipulated so that when mixed in small quantities with sound wheat it can scarcely be detected."

Effect of common mill fumigants on the baking qualities of wheat flour, G. A. Dean and C. O. Swanson (*Kansas Sta. Bul. 178, pp. 155–207, pls. 13*).—The fumigants studied were hydrocyanic-acid gas and carbon bisulphid used at the maximum strength employed in flour mills and elevators. Patent, straight, and low grade hard winter-wheat flours and patent, straight, clear, and low grade soft winter-wheat flours were treated in an air-tight constant-pressure chamber, for periods of 12 hours at a temperature of 90° F.

Immediately after each fumigation, baking tests were made and repeated under the same conditions two or three days later. Similar duplicate baking tests were made with the samples at the end of 30 days, and at the end of 60 days. For comparison, baking tests were also made under like conditions with the same flours not fumigated.

From a comparison of photographs of the loaves, and from the recorded data regarding the baking tests, the authors conclude that "the effects of fumigation are so small as to be negligible. It is only in the careful measurements employed in the test that any difference between the fumigated and unfumigated flour is apparent at all. The only notable difference appears in the maximum volume of the dough in the test made immediately after fumigation, but not after 30 days. The finished loaf shows no deleterious effect from fumigation in any of the tests."

Method for recording graphically the appearance of bread, K. Mohs (*Ztschr. Gesam. Getreidew., 3 (1911), No. 8, pp. 175, 176, fig. 1*).—In the method described impressions showing the texture of slices of bread are made by pressing them lightly upon paper inked with a mixture of soot and oil. The author believes that this method is more simple than photography for the permanent record of the texture of samples.

The technology of bread making, W. and W. C. Jago (*Chicago, 1911, Amer. Ed., pp. VIII+908+XXIV, pls. 12, figs. 123*).—In preparing the new edition of this volume (E. S. R., 7, p. 890), which deals with the chemistry, analysis, and practical testing of wheat flour and other materials employed in bread making and confectionery, as well as with the technology of bread making, much new material has been added, the authors state, and results of investiga-

tions carried on since the earlier volume appeared have been incorporated as well as the results of special tests.

New chapters have been added on the strength of flour, the bleaching of flour, wheat, flour, and bread improvers, the nutritive value and digestibility of bread, and the weighing of bread. "Subjects such as standard bread, and the use of additions to flour and bread have been critically and exhaustively examined." Special chapters are devoted to the application of chemical and other tests to routine mill practices and to the chemistry of raw materials and processes used by confectioners. An idea of the scope of the volume as a whole may also be gathered from the following titles of some other chapters: Enzyms and diastatic action; fermentation; manufacture of yeasts; physical structure and physiology of the wheat grain; chemical composition of wheat; chemical composition of flour and other milling products; bread making; special breads and bread making processes; bakehouse design; the machine bakery; analytic apparatus; commercial testing of wheats and flours; and bread analysis.

The volume is provided with an index.

Studies in nutrition.—III, The utilization of the proteins of corn, L. B. MENDEL and M. S. FINE (*Jour. Biol. Chem., 10 (1911), No. 5, pp. 345–352*).—Experiments on the nutritive value of corn proteins fed in comparison with meat led to the conclusion that, partially purified, they "were somewhat less thoroughly utilized than meat. Evidence was presented to indicate that this small difference may in great part be attributed to the cell residues remaining in the corn preparation employed." For earlier work see a previous note (E. S. R., 26, p. 155).

A brief discussion of the principles of candy making, LOUISE STANLEY (*Missouri Bd. Agr. [Pub.], 1911, Dec., pp. 8*).—In this summary, the author discusses candy making on the basis of the physical and chemical principles involved, and gives general directions and recipes for making candy of different types.

Concerning food conditions of German rural and urban populations, W. CLAASSEN (*Arch. Rassen u. Gesell. Biol., 8 (1911), Nos. 4, pp. 458–487; 5, pp. 604–627*).—A large amount of data is summarized and discussed.

According to the author's generalization, the average amount of digestible food consumed by the rural populataion per man per day, in the year 1907, supplied 146.1 gm. protein, 195.3 gm. fat, and 688.8 gm. carbohydrates. For the urban population, the values are 99.8 gm. protein, 140.6 gm. fat, and 466.9 gm. carbohydrates. The values for working men's families in German towns are 79.7 gm. protein, 129.4 gm. fat, and 419.7 gm. carbohydrates. Other similar values for men and women servants and for the proprietor and the manager of a large west Prussian farm are also given.

Food and living conditions of Italian peasants in the southern Provinces and in Sicily (In *Inchiesta Parlamentare sulle Condizioni dei Contadini nelle Provincie Meridionali e nella Sicilia. Rome, vols. 1, 1911, pp. 70–74; 2, pt. 1, 1909, pp. 156–208, figs. 15; 3, pt. 1, 1909, pp. 480–540, figs. 22; 4, pt. 1, 1909, pp. 393–447, figs. 31; 4, pt. 2, 1909, pp. 11–13; 5, pt. 1, 1909, pp. 53–62, 140–150, 192–196, 221–224; 5, pt. 2, 1909, pp. 463–514, figs. 17; 6, pt. 1, 1910, sect. 3–5, pp. 449–461*).—A large amount of statistical and other data regarding the food, clothing, and shelter of Italian peasants in the southern Provinces and in Sicily is included in the results of a parliamentary inquiry into rural conditions in these regions. The studies in the different Provinces were made and reported by the following experts: C. Jarach, E. Presutti, O. Bordiga, C. Gorio, L. dal Verne, A. Visocchi, E. Azimonti, E. Marenghi, and G. Lorenzoni.

Wages and prices of commodities (*U. S. Senate, 61. Cong., 2. Sess., Docs., 1909–10, vol. 46, pp. 801, dgms. 11*).—In this volume are gathered together a number of papers from different sources, which have been reprinted and issued as Senate documents. Among others may be mentioned the following: Increase in cost of food and other products; retail prices of food in the United States, 1900 to 1907, etc.; labor conditions and cost of living in Great Britain, etc. (E. S. R., 21, p. 464); prices of commodities in the Navy; prices of farm products, 1900 to 1909; report of the Massachusetts commission on wages and prices of commodities (E. S. R., 24, p. 366); wages and prices of commodities in Canada; and cost of living of the working classes in the principal industrial towns of Great Britain (E. S. R., 21, p. 464), the German Empire (E. S. R., 21, p. 465), France (E. S. R., 21, p. 465), and Belgium (E. S. R., 23, p. 169).

Municipal ordinances, rules, and regulations pertaining to public hygiene (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 26 (1911), No. 47, pp. 1842–1849*).—A summary of legislation regarding the preparation, care, and sale of foodstuffs, and similar matters, adopted in American cities and towns adopted since January 1, 1910.

Is vegetarianism capable of world-wide application? A. E. Taylor (*Pop. Sci. Mo., 79 (1911), No. 6, pp. 587–593*).—This careful study of the question takes into account factors not usually considered in discussions of the subject. While the author admits the possibility of living in health on a vegetarian diet, he reaches the conclusion that "for the present . . . it is certain and beyond speculation that to place the human race upon the basis of ethical vegetarianism would be to expose the race to the mercy of nature."

The nature of the repair processes in protein metabolism, E. V. McCollum (*Amer. Jour. Physiol., 29 (1911), No. 2, pp. 215–237*).—Investigations were carried on with a view to securing data as to the relative value of proteins of different origin, pigs being used as subjects.

According to the author's summary, the results obtained in feeding a mixture of proteins occurring in individual grains, in quantity equivalent to the animal's lowest possible level of protein metabolism, "do not indicate as wide differences in the nutritive values of the protein of the wheat, oat, and corn kernels as would be expected from the known chemical differences in these proteins.

"Experiments are described in feeding zein and gelatin, 2 proteins which are 'incomplete' chemically, in that they lack certain cleavage products known to be present in animal proteins. It is shown that the animal can utilize the nitrogen of zein very efficiently for repair of the losses due to endogenous or tissue metabolism. The average utilization of zein nitrogen for this purpose was about 80 per cent, for gelatin 50 to 60 per cent. No evidence was obtained of the formation of additional body tissue from zein, even when the latter was fed in great excess over the maintenance needs of the animal.

"Experiments in feeding casein as the only protein resulted in increases of the body protein of 20 to 25 per cent. These are the most successful growing experiments yet reported in which but a single protein was fed.

"The experimental data presented are shown not to harmonize with the most widely accepted theories concerning the mechanism of protein metabolism. The repair processes are shown to be of a different character from the processes of growth. The results of the work here presented are believed to indicate that the processes of cellular catabolism and repair do not involve the destruction and resynthesis of an entire protein molecule."

Studies of carbohydrate metabolism, F. Reach (*Biochem. Ztschr., 33 (1911), No. 5–6, pp. 436–448*).—From the experimental data presented the conclusion is reached that an increase in the blood sugar content follows the transition from

rest to work and that there is a change opposite in character when work follows rest.

Fasting studies: V, Studies on water drinking.—XI, The influence of an excessive water ingestion on a dog after a prolonged fast, P. E. Howe, H. A. Mattill, and P. B. Hawk (*Jour. Biol. Chem., 10 (1911), No. 5, pp. 417–432*).—Experimental data are reported in continuation of the authors' studies of fasting and of water drinking (E. S. R., 25, pp. 268, 572). The total nitrogen values, considered in connection with the values for creatin nitrogen and total purin nitrogen, the authors believe "furnish strong substantiation for the hypothesis that the increased nitrogen output associated with increased water ingestion is due to a true stimulation of protein catabolism rather than to a flushing of the tissues."

The influence of underfeeding on the blood, A. E. Boycott and R. A. Chisolm (*Jour. Path. and Bact., 16 (1911), No. 2, pp. 263–268*).—From experiments with small animals (rats) the following conclusions were drawn:

"Underfeeding with a diet deficient in proteid does not necessarily cause any wasting of the blood. It is suggested that this result throws some light on the duration of life of red cells in the circulation."

Calorific values of urine, C. Vallée (*Compt. Rend. Soc. Biol. [Paris], 71 (1911), No. 32, pp. 458–460*).—A study of the energy value of urine; particularly that from a meat diet, an ordinary mixed diet, and a lacto-vegetarian diet.

The force used in mastication in relation to the strength and health of the peridental membrane, G. V. Black (In *A work on operative dentistry.—I, The pathology of the hard tissues of the teeth. Chicago and London, 1908, vol. 1, pp. 161–171, pls. 2*).—Instruments and methods are described and the results of experiments reported.

The power of the human jaw (*Sci. Amer., 105 (1911), No. 23, p. 493, figs. 5*).—A summary of investigations of the work expended in biting and chewing food, carried on by Dr. G. V. Black (see above).

ANIMAL PRODUCTION.

Investigations on the changes in the nutritive value of feeds by fermentation in the silo and the accompanying loss in digestibility, F. Tangl and S. Weiser (*Landw. Vers. Stat., 74 (1911), No. 3–5, pp. 263–342; abs. in Zentbl. Agr. Chem., 40 (1911), No. 9, pp. 621–627*).—When green alfalfa was put into an unwalled pit in July and taken out in March the weight had decreased from 30,000 to 20,010 kg. The outer layers were more or less moldy, and in some places the silage was partially charred. The analysis of the green alfalfa was as follows: Water 13, crude protein 14.55, pure protein 12.05, fat 3.38, fiber 20.65, and nitrogen-free extract 42.67 per cent, and energy in 100 gm., 390.1 calories. The analysis of the silage was water 48, crude protein 10.62, pure protein 7.2, fat 1.63, fiber 10.31, and nitrogen-free extract 24.98 per cent, and energy in 100 gm., 235.6 calories. On a dry matter basis there was an increase in amids, pure protein remained the same, and there was a loss in all other nutrients.

In metabolism experiments with wethers it showed a loss in digestibility in all constituents. The digestion coefficients of the green alfalfa were crude protein 74.5, pure protein 71.7, fat 52.8, fiber 42.1, and nitrogen-free extract 63.9 per cent; of the silage, crude protein 48, pure protein 29.8, fat 44.9, fiber 38.2, and nitrogen-free extract 52.7 per cent.

Beet leaves and tops when siloed in a stack on the ground in October contained 6,556 kg. of dry matter, which at the end of January had decreased to 5,822 kg. The analysis of the fresh material was water 79.64, ash 4.05, crude protein 3.16, pure protein 2.14, amid 1.02, fat 0.48, fiber 2.3, nitrogen-free extract 10.38,

sugar 4.54, and oxalic acid 0.33 per cent; of the beet silage, water, 73.8, ash 11.68, crude protein 3.13, pure protein 2.43, amid 0.7, fat 0.51, fiber 2.98, and nitrogen-free extract 7.9 per cent. Digestion experiments showed a high decrease in digestibility for all constituents.

Corn stover silage made in an iron-concrete silo suffered only a slight loss in nutriment, as shown by digestion experiments, and this loss was offset by increased palatability. The analysis of the green fodder was water 15, crude protein 5.57, pure protein 4.89, fat 1.41, nitrogen-free extract 44.25, fiber 27.53, and ash 6.24 per cent. Analysis of the corn stover silage showed water 65, crude protein 2.51, pure protein 1.48, fat 0.95, nitrogen-free extract 17.1, fiber 11.64, and ash 2.8 per cent.

Forage crops and forage conditions in the Philippines, C. V. PIPER (*Philippine Agr. Rev. [English Ed.]*, *4* (*1911*), *No. 8*, *pp. 394–428*, *pls. 3*).—This contains statistics on the live stock of the Philippine Islands, a general discussion of the industry, and brief notes on about 50 species of grasses and forage plants which can serve as stock feeds in the Islands.

The report is summarized as follows: "The natural pasture lands in the Philippines are enormous in area and capable of supporting many millions of cattle and carabaos. These pastures improve under heavy grazing, especially where the spread of finer grasses like Bermuda is encouraged. Other pasture grasses should be introduced with the view of still further improving these pastures. For finishing feeds for beef cattle and hogs there is a large variety of easily grown forages available. These include corn, sorghum, teosinte, Japanese sugar cane, sweet potatoes, cassava, yams, chufas, peanuts, beggarweed, cowpeas, velvet beans, and soy beans. Other forages not yet introduced which should be fully tested are guinea corn and other grain sorghums, moth bean (*Phascolus aconitifolius*) kulthi (*Dolichos biflorus*), guar (*Cyamopsis psoralioides*), adsuki bean (*Phascolus angularis*), and ragi millet (*Eleusine coracana*).

"Hay for American and other horses can be cured during the dry season in Luzon, November to May, and probably in other islands. Rhodes grass under irrigation can be cut three times during the dry season if planted about November 1. Everything considered this is the best known grass for the Philippines. Other grasses of promise for hay are Tunis grass, Natal grass, and Sudan grass. The last named usually grows too coarse to cure easily. Italian rye grass has given more promising results in the high mountain region than any other. It should be tested further as a hay grass. For green forage several coarser grasses do well and are valuable. These include guinea, Pará, and molasses grasses. Grains that can replace oats in part are palay (unhulled rice) and maize. Mayuen (*Coix lachryma-jobi* var. *mayuen*) is also worthy of careful trial and perhaps also guinea corn, a variety of sorghum. It also seems feasible to grow the seed of various beans for horse feed, especially horse gram (*Dolichos biflorus*), at present not grown in the Islands."

Brief notes are given on the following forage plants: *Andropogon aciculatus*, *A. contortus*, *A. halepensis propinquus*, *A. intermedius hankei*, *A. nitidus*, *A. serratus*, *A. sericeus*, *Apluda mutica*, *Arundinella setosa*, *Axonopus semialatus*, *Centotheca malabaria*, *Chloris barbata*, *C. gayana*, Job's tears (*Coix lachryma-jobi*), Bermuda grass (*Cynodon dactylon*), sand spur (*Cenchrus echinatus*), crab grass (*Digitaria sanguinalis*), *D. consanguinea*, *D. longiflora*, *Dactyloctenium ægyptiacum*, *Diplachne fusca*, finger grass (*Eleusine indica*), ragi millet, (*E. coracana*), *Eragrostis elegantula*, *E. interrupta*, *E. spartinoides*, *E. tenella*, *E. viscosa*, teff grass (*E. abyssinica*), *Eriochloa ramosa*, *Ischæmum arundinaceum radicans*, *I. muticum*, *I. rugosum distachyum*, zacate, barit

(*Leersia hexandra*), *Leptochloa chinensis*, rice, *Panicum amplexicaule*, *P. auritum*, barnyard millet (*P. crus-galli*), *P. colonum*, *P. distachyum*, *P. flavidum*, *P. indicum*, *P. paludosum*, *P. patens*, *P. pilipes*, luyaluya (*P. repens*), *P. reptans*, *P. stagninum*, carabao grass (*Paspalum conjugatum*), *P. longifolium*, *P. scrobiculatum*, *P. compressum*, *P. dilatatum*, *Pennisetum macrostachyum*, *Polytrias amaurea*, *Rottboellia exaltata*, *R. ophiuroides*, talahib, (*Saccharum spontaneum*), foxtail millet (*Setaria flava*), *Sporobolus indicus*, *Themeda gigantea*, *T. triandra*, *Thuarea involuta*, Korean lawn grass (*Zoysia pungens*), manimanihan (*Alysicarpus vaginalis*), *Desmodium capitatum*, *D. procumbens*, *D. triflorum*, sensitive plant (*Mimosa pudica*), *Vigna lutea*, seeta bean (*Phaseolus calcaratus*), mung bean (*P. max*), moth bean (*P. aconitifolius*), adsuki bean (*P. angularis*), Lyon bean, velvet bean, carob (*Ceratonia siliquosa*), catjang, algaroba, guar (*Cyamopsis psoralioides*), kulthi (*Dolichos biflorus*), bonavist (*D. lablab*), sulla, soy bean, cowpea, peanut, taro, yautia, common vetch, hairy vetch, red clover, white clover, alsike clover, Japan clover, Mexican clover, sweet potato, yam, chufa, cassava, Jerusalem artichoke, oats, millet, pearl millet, Japanese millet, broom-corn millet, milo, Kafir, teosinte, maize, sorghum, sugar cane, orchard grass, Colorado grass, Italian rye grass, Tunis grass, cogon (*Imperata cylindrica kœinigii*), St. Augustine grass (*Stenotaphrum americanum*), Natal grass (*Tricholæna rosea*), Guinea grass, Para grass, and molasses grass (*Melinis minutiflora*).

[**Report on feeding stuffs**], N. W. GILBERT ET AL. (*Philippine Agr. Rev. [English Ed.]*, *4 (1911)*, *No. 8, pp. 429–466, pls. 2*).—This consists of extracts from a report of a board appointed by the Secretary of War to investigate and report on the present cost of forage crops for the use of the army in the Philippine Islands. It contains a list of the common feeding stuffs, data as to the amount and value of feeds imported, the cost of the daily feed of horses in private and in government stables, and a discussion of the value of native and imported feeds.

From feeding tests with horses and mules which were undertaken to determine the value of feeds which can be produced in the islands it is concluded that either native cracked corn or native palay can be fed in lieu of a portion of the oats now used; the best mixture appears to be 5 lbs. of oats and 4 lbs. of the cracked corn or palay per day. The palay was not found as palatable, as nutritious, or as safe, however, as the cracked corn. Native green forage (barit, barili, luyaluya, guinea grass, or green corn fodder) can be fed in lieu of a portion of the hay allowance when it can be procured in sufficient quantities and at profitable prices. The army has been feeding these green forages wherever possible for a considerable time. Cured and baled native corn-blade fodder, baled guinea hay or baled Rhodes grass hay can be grown successfully and used in lieu of American hay, but at the present time it is impossible to procure them, although efforts are being made to develop the industry.

Special feeding stuff analyses, 1910, R. E. ROSE and E. P. GREENE (*Fla. Quart. Bul. Dept. Agr., 21 (1911)*, *No. 1, pp. 83–102*).—These analyses include velvet beans, beggarweed hay, giant millet, maiden cane hay, kudzu hay, alfalfa meal, dried molasses beet pulp, bran, middlings, ship stuff, oats, cotton-seed meal, gluten feed, blood meal, rice bran, and proprietary feeds.

The feeding-stuffs inspection for 1911, B. E. CURRY and T. O. SMITH (*New Hampshire Sta. Bul. 154, pp. 8*).—The percentage of protein and fat and the retail price per 100 lbs. of the following feeds are reported: Cotton-seed meal, gluten feed, beef scraps, animal meal, ground fish scraps, bone and meat meal, molasses feed, brewers' grain, hominy feed, linseed meal, dried-beet pulp, and proprietary mixed feeds.

The text of the amended state feeding stuffs law is also given.

Analyses of feeding stuffs, E. HASELHOFF (*Jahresber. Landw. Vers. Stat. Marburg, 1909–10, pp. 10–15*).—Analyses are reported of peanut, sesame, turnip, linseed, palm-nut, coconut, bassia, coffee, corn-oil, and beechnut cakes; cotton-seed, rice, meat, fish, and soy-bean meals; wheat and rye brans; ground barley; distillery slop; brewers' grains; malt germ; molasses feed; beet chips; oats; barley; field beans; potatoes; and mixed feeds.

The valuation of carbohydrates and protein in commercial feeds, P. H. ROLFS (*Proc. Soc. Prom. Agr. Sci., 31 (1910), pp. 107–109*).—A method is proposed for estimating the value of the protein and carbohydrate content in commercial feeding stuffs, so that different feeding stuffs can be compared as to their nutritive value.

Digestion of cellulose by the dog, and methods for the quantitative determination of cellulose, H. LOHRISCH (*Hoppe-Seyler's Ztschr. Physiol. Chem., 69 (1910), No. 2, pp. 143–151*).—The author has repeated some of his work with the dog, with particular reference to the method employed for determining the cellulose and the findings of Lötsch and Scheunert and of Grimmer and Scheunert (E. S. R., 23, p. 417). He now concludes that dogs can not digest cellulose, but does not believe that Scheunert's criticism applies to cellulose digestion in man.

A contribution to the study of the protein metabolism of the fetus.—The distribution of nitrogen in the maternal urine and in the fetal fluids throughout pregnancy, DOROTHY E. LINDSAY (*Bio-Chem. Jour., 6 (1911), No. 1, pp. 79–99*).—An examination of the adult urine and the fetal fluids of cattle, sheep, and goats was made in order to discover if there are any characteristic differences between adult and fetal protein metabolism. The results are summarized as follows:

"Certain differences are shown to exist between the distribution of nitrogen in the urine of the bullock and of the cow. The urine of the cow contains a large amount of allantoin and of hippuric acid. In the bullock's urine the amino acid content is much smaller and contains a much smaller proportion of hippuric acid, while allantoin is almost entirely absent.

"There is an increase in the amount of nonprotein nitrogen in the fetal fluids throughout the first half of pregnancy. But the amount of nitrogen per unit of weight of the fetus decreases regularly. The fetal fluids are shown to contain the ordinary urinary constituents of adult urine—urea, allantoin, monamino acids, creatinin, creatin, with, in addition, small amounts of polypeptid nitrogen, nitrogen in diamino acids, and nitrogen in compounds which are not found in the adult urine, and the nature of which has not so far been elucidated.

"Variations in the distribution of nitrogen in the fetal fluids throughout the course of pregnancy exist, which, in the main, consist of a decrease in the proportion of urea nitrogen with a corresponding increase in the proportion of allantoin and amino acid nitrogen. A study of the early allontoic fluid—the urine of the early fetus—shows, as compared with the adult urine, a low urea content, a high proportion of allantoin and amino acids, and a large amount of undetermined nitrogen.

"It is therefore concluded that the fetal metabolism differs from that of the adult in the less complete catabolism of the protein and in the greater activity of nuclear metabolism as indicated by the amount of allantoin."

Nuclein metabolism in swine, F. MEIER (*Über den Nukleinstoffwechsels des Schweines. Inaug. Diss., Univ. Giessen, 1910, pp. 35*).—As in the case of dogs and rabbits nucleic acid when given in the feed of swine was largely resorbed and reappeared as an end product in the allantoin fraction. Only small per-

centages appeared in uric acid and purin bases. The purin bases of the urine consisted chiefly of hypoxanthin and some adenin. Guanin was not present.

Notes on the creatinin excretion of the pig, E. V. McCollum (*Amer. Jour. Physiol., 29 (1911), No. 2, pp. 210–214*).—A nearly constant ratio of creatinin nitrogen was found when pigs were supplied salts and energy in the form of starch but no nitrogen. It is suggested that if this ratio is determined for a number of different species of animals it will be an easy method for determining the endogenous nitrogen metabolism and also serve as a basis for calculating rations for animals employed in exact nutrition studies.

Contribution to the knowledge of the function of the liver, E. Wehrle (*Biochem. Ztschr., 34 (1911), No. 3–4, pp. 233–241*).—The action of the liver in geese was studied by tying 2 ligatures to the portal vein.

Analysis of the urine showed that carbohydrates were assimilated even when the liver did not function. The tolerance to some sugars, particularly levulose, was not much different than that under normal conditions. There was an increase of ammonia excretion, and after the addition of glycocoll the excretion of amino acid was greater than normal.

Spontaneous generation and a physico-chemical theory of life, S. Leduc (*Théorie Physico-Chimique de la Vie et générations Spontanées. Paris, 1910, pp. 202, figs. 57; rev. in Rev. Gén. Sci., 22 (1911), No. 1, p. 41; Science, n. ser., 33 (1911), No. 843, pp. 304, 305*).—This summarizes recent investigations in synthetic biology.

Life is described as a transformer of matter and energy, and hence the science of biology is considered as a department of the physico-chemistry of fluids. The author has artificially produced nucleated cells with gelatin and a few drops of potassium ferro-cyanid, and points out that the immediate task of synthetists is not the production of albuminoids but a chlorophyllian substance which will decompose carbon dioxygen dissolved in water and be capable of assimilating carbon.

The mechanism of life, S. Leduc, trans. by D. Butcher (*London, 1911, pp. 190*).—This is an English translation of the work noted above.

Studies on the size of the cells, A. Berezowski (*Arch. Zellforsch., 7 (1911), No. 2, pp. 185–189*).—Studies on the influence of castration on the size of the cells are reported.

The cells of intestinal epithelium of castrated mice were measured and found to be both longer and broader, and therefore contained a much larger surface than in uncastrated mice. The size of the nucleus remained practically the same.

Cell changes in the tests due to X-rays, J. O. W. Barratt and C. Arnold (*Arch. Zellforsch., 7 (1911), No. 2, pp. 242–276, pls. 2*).—The changes in structure and function of the testis are reported in experiments with normal full-grown rats.

Interstitial testicular cells and secondary sex characters, L. Mazzetti (*Anat. Anz., 38 (1911), No. 14–15, pp. 361–387, figs. 14; abs. in Jour. Roy. Micros. Soc., 1911, No. 3, p. 348*).—From a study of these cells in various vertebrate types the author finds that they arise from the transformation of connective tissue cells which lie between the proliferative tubules and in the lymphatic lacunæ. They seem to have but little connection with the development of the secondary sex characters. This was affected by the reabsorption of the seminal fluid, seminal cells, and their secreted products.

The sexual cells and the determination of sex, E. Bugnion (*Bul. Soc. Vaud. Sci. Nat., 5. ser., 46 (1910), No. 169, pp. 263–316*).—A review of the principal theories of the determination of sex which have been offered. A list of 250 references is appended.

The sex-determining factor in animals, S. KOWALEWSKY (*Biol. Centbl., 31 (1911), No. 18, pp. 580–592, figs. 2*).—A contribution to the voluntary determination of sex in birds and mammals.

Data are presented in support of the theory that the rate of oxidation at fertilization and in the early stages of cleavage is a factor in the determination of sex. In guinea pigs and rabbits female fetuses were found in that portion of the uterus which received the greatest supply of blood, whereas males were in the less richly nourished portions. Subcutaneous injections of alcohol led to the production of a preponderance of males in guinea pigs. These and other factors are brought forward as indicating that poor nutrition favors the production of males.

The hereditary material and the cell as the basis of heredity, A. PRENANT (*Jour. Anat. et Physiol. [Paris], 47 (1911), No. 1, pp. 1–59, figs. 8*).—A general summary of information on this topic. A bibliography is appended.

A note on certain biometrical computations, R. PEARL and LOTTIE E. MCPHETERS (*Amer. Nat., 45 (1911), No. 540, pp. 756–760*).—Tables are given of hitherto unpublished sums of logarithmic functions which can be used for fitting growth curves. They were originally made in studying the functions of successively laid eggs, as previously noted (E. S. R., 21, p. 269). The use of the tables in fitting curves by the method of least squares is illustrated by concrete examples based on measurements of eggs.

The doctrine of evolution; its basis and its scope, H. E. CRAMPTON (*New York, 1911, pp. IX+311*).—This volume consists of a series of lectures delivered as the Hewitt lectures of Columbia University at Cooper Union, New York City, 1907. It treats of the essential characteristics of living things and the factors concerned in the evolution of species.

The study of likeness and relationship in hybridization, H. POLL (*Arch. Rassen u. Gessell. Biol., 8 (1911), No. 4, pp. 417–437, pls. 2*).—A discussion of various degrees of sterility, particularly those which occur between different species of birds.

On the inheritance of acquired characters: A hypothesis of heredity, development, and assimilation, E. RIGNANO, trans. by B. C. H. HARVEY (*Chicago, 1911, pp. 413*).—The author points out that Weismannism is untenable because it does not provide any satisfactory theory of the mechanism of inheritance and because it is not in accord with the biogenetic law that ontogeny is a recapitulation of phylogeny. Also, both the preformistic and epigenetic theories of development are unsatisfactory, the former because it does not account for the inheritance of acquired characters, and the latter because it requires the rejection of nuclear somatization. He, therefore, suggests a dynamic memory theory, called centro-epigenesis, which is expected to avoid the aforesaid difficulties by assuming that vital phenomena are essentially the results of intranuclear oscillating nervous discharges, and that the specific nervous current deposits in the membrane centers a definite substance which, in turn, is capable of again provoking the same specificity of current as that by which it was deposited in a manner similar to that of electric accumulators.

Appended is an essay reprinted from the *Monist*, July, 1911, on The Mnemonic Origin and Nature of Effective Tendencies. By effective tendencies the author means appetite, hunger, and other properties of the organism which tend to keep it in a physiological equilibrium.

Centro-epigenesis: Remarks on some problems of general embryology, S. BECHER (*Biol. Centbl., 29 (1909), Nos. 16, pp. 506–522; 17, pp. 523–544; 18, pp. 555–564*).—A discussion of Rignano's hypothesis, noted above.

The position of the question of the inheritance of acquired characters, R. SEMON (*Der Stand der Frage nach der Vererbung erworbener Eigenschaften.*

Berlin and Vienna, 1910, pp. 82; Fortschr. Naturw. Forsch., 2 (1911), pp. 1–82).—A critical review and bibliography of recent work.

The inheritance of color in Shorthorn cattle.—A study in somatic blends acompanying gametic segregation and intra-zygotic inhibition and reaction, H. H. LAUGHLIN (*Amer. Nat., 45 (1911), No. 540, pp. 705–742, figs. 11; 46 (1912), No. 541, pp. 5–28*).—This article discusses the origin and inheritance of coat color in Shorthorns.

From data gathered from various sources the author states that the single unit coat color hypothesis, which does not explain the facts, should be replaced by the following: "There are 2 groups of genetically independent sets of hairs intermingled to make up the Shorthorn color coat. One set is alternatively 'positive white' (W) and red (R), in which the white is dominant and the red recessive; the other set is alternatively red (R) or 'albinic white' (wr), in which the red is dominant and the white recessive. Dominant white is caused by a specific antibody existing in the zygote in small quantities, retarding or inhibiting the ontogenesis of the determiner for pigmentation. The same body existing in larger quantities reacts with and destroys the determiner for pigmentation, causing recessive or albinic white."

The dominant white of the Shorthorn is thought to be derived from the Romano-British cattle, and the recessive white from the Dutch flecked, the colored areas of which took the differential coloring because they lacked the positive graying factor. The spotted color pattern or coarse mosaic came in with the Dutch bulls of the eighteenth century importation.

In regard to somatic blends the author says: "Blends are essentially the somatic aspects of the fortuitous combinations of the patent and latent phases of two or more genetically independent units. In this sense Galton's law may justly stand for the general measure of ancestral influence—a measure of the operation of the laws of chance. The existence of somatic blends can not be denied, for they are among the most definite things commonly observed in inheritance. The more cursory the examination and the more general the view of such cases, the more seeming the blend; however, a more minute inspection often reveals the segregation of the parental factors, all of which points toward the minuteness of the unit character and the purity of the gamete. Were blending in the commonly understood sense a fact, all individuals of a race or a strain would in a few generations become identical with each other. It is the creation of new units by intra-zygotic reactions and intra-gametic intrusions, together with the segregation and recombination of the unaltered ultimate units of inheritance that have given selection such an opportunity for developing so many strains and species."

On the occurrence of fat in the epithelium, cartilage, and muscle fibers of the ox.—On the histogenesis of the adipose tissue of the ox, E. T. BELL (*Amer. Jour. Anat., 9 (1909), No. 3, pp. 401–438, pls. 2, figs. 13*).—A study of the nature of adipose tissue and the distribution of fat in the different organs of the body of the fetal calf and of fat in steers. The work was done in connection with that already noted from another source (E. S. R., 25, p. 273).

Preceding the formation of adipose tissue was an open-meshed fibrillar connective tissue, consisting of loosely arranged cells. "In the formation of a fat lobule the cells adjacent to the blood vessel are filled with fat first. The filling of the cells with fat extends from the blood vessel outwards in all directions. This process is closely similar to the deposition of fat in the liver where it is deposited first in the cells immediately adjacent to a vein and later into those lying farther out.

"The branched preadipose cell becomes rounded by the accumulation of fat in its interior. Its processes are absorbed. The cell membrane is differentiated

from the peripheral protoplasmic layer of the cell. It begins to form when the cell is yet branched. The Altmann granules are found in the protoplasm of all fat cells. They are first observed when the cell is yet branched and before the first fat droplets are formed.

"The mass of adipose tissue increases in amount in fattening (a) by the increase in the size of its cells, (b) by the formation and filling of new cells in the interior of the lobule, (c) by the formation of new lobules."

"Fat droplets were found in the cells of the liver in nearly all the fetuses examined—the youngest being 4.7 cm. long. . . . Fat droplets were found inside the muscle fibers from the 7 cm. to the 28 cm. stage. No fat was found in this situation in older fetuses. . . . The cells of hyaline cartilage were found to contain fat droplets throughout fetal life (from the 7 cm. stage) and also in the adult. The renal cells of some fetuses contain fat droplets. In certain parts of the kidneys of 2 large fat steers, the cells of the renal tubules were loaded with fat droplets. The fat droplets found inside epithelium, cartilage, and muscle, unlike the fat in the fat cells, is independent of the nutritive condition of the animal."

"Three of the animals slaughtered were very fat. One of these, a well-known prize winner in the show ring, was 3 years old, and had been excessively fat for over a year. The subcutaneous fat was in some places over 8 cm. thick. None of these animals had any fat in the epithelium of the glands examined or inside the muscle fibers. Fat droplets were present in the cells of the articular cartilage. The second group of animals, 3 in number, were moderately fat. In 2 of these fat droplets were found in the hepatic cells. The cartilage cells of all three contained fat droplets.

"A third group of 6 animals were comparatively thin, the subcutaneous layer of fat being only a few millimeters thick. In one of these some of the cortical renal tubules were full of fat droplets. The cartilage cells of all contained fat. Two animals showed a considerable amount of fat in the cortical cells of the adrenal.

"A fourth group of animals were exceedingly thin, having been kept on submaintenance several months. They were fed so that they were made to lose weight at the rate of about half a pound a day. The connective tissue fat deposits were nearly exhausted. One of the animals showed a large amount of fat in the cortex of the adrenal. All three show fat inside many of the muscle fibers. The cartilage cells of one animal were examined and found to contain the usual amount of fat."

Investigation on the rutting of cows, E. WEBER (*Arch. Wiss. u. Prakt. Tierheilk., 37 (1911), Nos. 4, pp. 382–406; 5, pp. 442–454*).—A review of the work of many investigators, in which are included the observations of the author, on all phases of the phenomena of rutting. A bibliography is appended.

The results of pasturing young cattle (*Jahresber. Landw. Kammer Wiesbaden, 1910, pp. 72–81*).—Measurements are given of the gains made by young cattle on pasture in 1908, 1909, and 1910.

Substitutes for skimmed milk in raising calves, E. S. SAVAGE and G. W. TAILBY, Jr. (*New York Cornell Sta. Bul. 304, pp. 3–32, figs. 14*).—A revision of a bulletin previously noted (E. S. R., 22, p. 73), with a supplementary statement in regard to the development of some calves used in the earlier work as 2-year-olds and 3-year-olds. As much constitutional vigor was manifested by the animals that were in poorer condition at 5 months of age, through having been fed substitutes for skim milk, as by the animals which had received skim milk and were in better condition at that age.

"The heredity of the animal is of more consequence than any moderate influence in the care or feeding for a short time at the beginning of the development

of the individual. If the calf is not stunted permanently by continuing poor feed for too long a time, the lack of thrift, which might result from using a substitute for milk from the time the calf is 10 days or 2 weeks old until he is on hay and grain entirely, may be overcome in the later development of the animal if the dry food given from the time he is 5 months of age is proper and sufficient in amount."

The origin of sheep, C. J. DAVIES (*Live Stock Jour.* [*London*], *74* (*1911*), *Nos. 1963, p. 509; 1964, p. 533*).—This contains data on the ancestry of sheep and the history of sheep breeding.

Shearing twice v. shearing once, C. M. MALLINSON (*Agr. Jour. Union So. Africa, 2* (*1911*), *No. 4, pp. 432–434*).—An argument is presented to show that it is less profitable to shear sheep twice a year, as is now the common practice in South Africa, than it is to shear only once.

The castor oil plant (Ricinus communis) as a fodder, M. H. REYNOLDS (*Agr. Gaz. N. S. Wales, 22* (*1911*), *No. 10, p. 888*).—Brief notes on experience in allowing sheep to browse on frozen castor oil plants. The mutton was slightly tainted, but the flesh was normal in color.

The cause of "apoplexy" in winter-fed lambs, H. H. WING (*New York Cornell Sta. Bul. 305, pp. 33–47, figs. 2*).—A report is given of feeding tests supplementary to those previously reported (E. S. R., 24, pp. 578, 588), 289 lambs being divided into 4 lots. The rations consisted of corn, oats, Ajax flakes, gluten feed, clover hay, pea and oat hay, and silage.

In 110 days the lot on a wide ration 1 : 8.4, including silage, made an average gain per head of 22.7 lbs., at a cost of 10.6 cts. per pound. The lot on a wide ration 1 : 8.3, which contained no silage, made an average gain per head of 15.7 lbs., at a cost of 15.9 cts. per pound. The lot on a narrow ration 1 : 5.2, and which included no silage, made an average gain per head of 18.9 lbs., at a cost of 13.2 cts. per pound. The lot on a narrow ration 1 : 5.3, which included silage, made an average gain per head of 25.1 lbs., at a cost of 9.6 cts. per pound.

Thus the narrow ration was superior to the wide ration, and silage was a great advantage in both cases. At the end of the test most of the lambs were sold, but some were reserved several weeks longer and kept on a wide ration. Though a few lambs died during the test there were no cases of so-called "apoplexy" as in the previous work. "In most of these animals there was found a congestion or inflammation of the intestines. It is probable that most of them died from intestinal trouble, either catarrhal inflammation or hemorrhagic inflammation of the small intestines or cecum."

Studies on the ancestry of Siska swine, S. ULMANSKY (*Ztschr. Landw. Versuchsw. Österr., 14* (*1911*), *No. 8, pp. 963–1021, pls. 3, figs. 8*).—A more technical account of these breeds, which have been previously noted.

The author concludes that the Siska pig is a direct descendant of the common wild pig of Europe and was originally domesticated north of the Carpathian Mountains, and that the Syrmie-Mangalica and the Turopolje breeds are the result of a cross of the Siska and an Asiatic type. The skull of the typical Syrmie-Mangalica is different from that of the black type. The Bosnia wild pig is not identical with the wild pig of central Europe but is a form of it. Many measurements of the skeleton are given.

A bibliography is appended.

Notes on the progenitors of certain strains of the modern American horse, C. NOCKOLDS (*Jour. U. S. Cavalry Assoc., 21* (*1910*), *No. 81, pp. 428–443; 21* (*1911*), *Nos. 82, pp. 660–665; 83, pp. 864–880; 22* (*1911*), *No. 87, pp. 437–450*).—These articles contain data on the ancestry of the horse, history of horse breeding in ancient and modern times, and notes on some famous American horses.

Mustangs, busters and outlaws of the Nevada wild horse country, R. STEELE (*Amer. Mag., 72 (1911), No. 6, pp. 756–765, figs. 12*).—A popular account of the methods of capturing and training for service the wild horses in the western United States. There are said to be many thousand of these horses in Nevada alone.

The army horse, F. VON DAMNITZ (*Das Armeepferd und die Versorgung der modernen heere mit Pferden. Leipsic, 1911, pp. 111*).—A small treatise on the desirable characteristics of horses needed in the army, and how the supply for the future can be maintained.

Scheme for encouraging the breeding of Irish draft horses (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 3, pp. 525, 526*).—An official document outlining a method for government assistance for improving the draft horse in Ireland.

The utilization of the zebra and its hybrids, H. W. PITCHFORD (*Agr. Jour. Union So. Africa, 2 (1911), No. 4, pp. 483–485*).—The advantages of using zebras as draft animals are pointed out.

Practical poultry keeping, A. W. FOLEY (*Alberta Dept. Agr., Poultry Bul. 2, pp. 79, figs. 66*).—This contains a table of temperatures taken in different types of poultry houses, and discusses poultry house construction, hatching, brooding, fattening, winter egg production, and related topics.

English and Australian laying competitions, E. BROWN (*Jour. Bd. Agr. [London], 18 (1911), No. 7, pp. 579–589, figs. 2*).—A discussion of the results of these competitions, and the lessons to be drawn therefrom.

The cold storage of eggs, G. BRADSHAW (*Agr. Gaz. N. S. Wales, 22 (1911), No. 11, pp. 994–1000*).—A résumé of methods for preserving eggs in various ways, and in particular the keeping of eggs in cold storage as practiced in New South Wales. Some statistical data on the extent of the industry are given.

DAIRY FARMING—DAIRYING.

Feeding experiments with milch cows, N. O. HOFMAN-BANG ET AL. (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 76 (1911), pp. 41+76*).—A 5-year test in the comparative feeding values of different kinds of hay, grain, and roots. The trials were made on 6 different estates, with 51 lots of cows of 10 each, according to the plan adopted in the Danish cow-feeding experiments (E. S. R., 9, p. 983). The rations fed did not vary greatly from those ordinarily fed on Danish dairy farms.

The results of the trials are briefly summarized as follows: Two and one-half kg. meadow hay and 1 kg. dry matter in roots could very nearly replace each other, and both easily replaced 1 kg. of mixed barley and oats both as regards the quantity and quality of milk and the health of the cows. Three kg. of meadow hay and 2¾ kg. of alfalfa hay could likewise replace 1 kg. oil cakes (a mixture of cotton-seed meal, peanut cakes and sunflower cakes). An addition of 1 kg. of meadow hay or 1 kg. of alfalfa daily per cow caused an appreciable increase in the flow of milk, and the same held true with an addition of 5 kg. of straw daily per cow.

Complete data relating to the rations fed, the amounts and quality of milk produced per lot during the different periods, weights of cows, and the chemical composition of the different feeds and milk are given.

Influence of sesame cake on the quality of butter, L. F. ROSENGREN (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 47, pp. 4; K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 7, pp. 621, 622*).—The experiments made by the author showed that sesame cake was similar to peanut cake as regards influence on the flavor of butter, and that it produced a good quality of butter in allowances up to 3 kg. per cow daily.

The danger of using milk from slop-fed cows, E. C. AVIBAGNET (*Arch. Méd. Enfants, 13 (1910), No. 12, pp. 881–903; rev. in Med. Rec.* [*N. Y.*], *79 (1911), No. 18, p. 588*).—According to the author's clinical observations, diseases of children are sometimes caused by milk from cows fed distillery slop. It is thought that a toxin is developed which passes into the milk. Milk produced by cows fed by-products of distilleries and beet-sugar factories is thought by the author to be unfit for feeding to children.

The cell content of milk, H. E. ROSS (*New York Cornell Sta. Bul. 303, pp. 775–793, fig. 1*).—A modification of the volumetric method devised by Doane and Buckley for counting cells in milk (E. S. R., 17, p. 181), was used in this experiment, the method being described in detail.

The following are some of the conclusions: "The relation between the number of cells present and the amount of sediment is not definite. . . . An average variation in cell content of 12.32 per cent was obtained in the same sample of milk. . . . The cell content of milk from 50 different cows varied from 4,000 to 3,576,000 per cubic centimeter. All of the cows appeared healthy and normal. Strippings have a higher cell content than either fore milk or middle milk. Fore milk usually has the least number of cells. Manipulating the udder increased the cell content of milk only when the manipulation was sufficiently vigorous. The number of cells per cubic centimeter of the milk of individual cows varies mostly within certain limits. Relation between number of cells and percentage of fat is not constant nor definite. The number of cells decreases relatively as the amount of milk decreases. The results obtained indicated that evening milk has a slightly higher cell content than morning milk. Colostrum has a higher cell content than has normal milk. Enough information concerning the real significance of leucocytes in milk is not available to warrant the establishment of so-called 'leucocyte standards.'"

A count was made of milk taken from an injured quarter, which showed 62,400,000 cells per cubic centimeter, and from the 3 sound quarters, 407,000 cells per cubic centimeter. This showed that one quarter may be seriously affected without similarly affecting the other quarters.

The action of animal extracts upon the secretion of the mammary gland, I. OTT and J. C. SCOTT (*Ther. Gaz., 35 (1911), No. 10, pp. 689–691*).—This contains details of work previously noted (E. S. R., 25, p. 176).

In regard to the complement of woman's milk, KOLFF and NOEGGERATH (*Jahrb. Kinderheilk., 70 (1909), No. 6, pp. 701–731; abs. in Hyg. Rundschau, 20 (1910), No. 9, pp. 482, 483*).—Woman's milk and colostrum contain very little hemolytic complement and no bactericidal complement. It is concluded that the small amount of hemolytic complement present does not warrant the existing nutritional and physiological theories in this regard.

Fat splitting by bacteria, N. L. SÖHGEN (*K. Akad. Wetensch. Amsterdam, Versl. Wis en Natuurk. Afdeel., 19 (1910–11), pt. 1, pp. 689–703, pls. 4; abs. in Chem. Zentbl., 1911, I, No. 4, pp. 248, 249; Jour. Chem. Soc.* [*London*], *100 (1911), No. 582, II, p. 319*).—Numerous species of bacteria were found which could oxidize fats and also saponify them in the absence of oxygen. They denitrified nitrates and nitrites when present. The anaerobes made good growth when fat was the only source of carbon and ammonium chlorid the only source of nitrogen.

The various processes were thought to be due to the secretion of lipase, and some species secreted 2 lipases.—α-lipase, which acts both in acid and alkaline solution, and a more active β-lipase, which is found in acid media but becomes active only after neutralization. Milk was found to be a favorable medium for the fat-splitting bacteria, and in spontaneously infected milk their growth rose and fell with the lactic-acid species of bacteria, since their activity de-

pended upon the formation of acid. The deterioration of dairy products is supposed to be due to the lipolytic qualities of these bacteria, and also to the production of bitter substances and unpleasant odors from the splitting of the nitrogenous compounds.

Bacteria as a cause of a strawberry-like odor in milk, O. FETTICK (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 9, pp. 280–283*).—A species of bacterium, thought to be the cause of a strawberry-like odor in milk, was isolated from a sample of milk and appeared to have the properties of *Pseudomonas fragaroidea.*

[Official methods of testing dairy products], O. F. HUNZIKER (*N. Y. Produce Rev. and Amer. Cream., 33 (1911), No. 3, p. 160*).—A report of the chairman of the committee on official methods of testing dairy products of the Dairy Instructors' Association, which defines the requirements for Babcock glassware used in the official test for milk, cream, and skim milk.

Babcock test errors, W. ANDREWS ET AL. (*N. Y. Produce Rev. and Amer. Cream., 33 (1911), No. 2, pp. 90–92*).—This consists of opinions of a number of practical creamerymen on the causes of error in testing milk and cream under average creamery conditions.

"The investigations that have already been made into the accuracy of the Babcock test under average creamery conditions have usually disclosed inaccuracies surprisingly large, and have furnished advocates of state control of testers through license and state inspection of the glassware used in these tests with very convincing arguments. We believe that many creamerymen would themselves be surprised at the errors their testing results reflected if they had their work examined and checked up. The Babcock test itself is not to blame for the many inaccuracies committed in its name; it is the failure of so many operators to realize the delicacy of the test and the many chances of error if the utmost care is not constantly employed from the taking of the sample to the final recording of the reading."

The certification of milk, J. P. WALKER (*Pub. Health [London], 25 (1911), No. 3, pp. 93–97*).—A discussion of that part of the report of the Royal Commission appointed to inquire into the relations of human and animal tuberculosis which relates to what is being done in different countries to produce clean, sanitary milk supplies.

The report of the Philadelphia milk show, edited by A. E. POST (*Philadelphia, 1911, pp. 123, pls. 43*).—An account of the milk show held in May, 1911, which was very successful from an educational point of view. The list of papers read at the different meetings held in connection with the show is given.

Annals of dairying in Europe.—Dairy husbandry from prehistoric times, L. M. DOUGLAS (*Cream. Jour., 22 (1911), Nos. 10, pp. 9–11, figs. 2; 11, pp. 1, 2, figs. 4; 12, pp. 1, 2, figs. 2; 13, pp. 1, 8; 14, pp. 1–3, figs. 4; 15, pp. 10–12, figs. 8; 16, pp. 1, 16; 17, pp. 21–23; 19, pp. 6, 18; 21, pp. 4, 5, fig. 1*).—A continuation of earlier work (E. S. R., 25, p. 478).

Report on mountain dairying for 1910, N. ÖDEGAARD, O. T. GILLEBO, and L. FUNDER (*Separate from K. Selsk. Norges Aarsber. 1910–11, pp. 23*).—This contains reports of work done at the 2 state mountain dairies in Norway, with discussions of the present condition of mountain dairying in different parts of Norway and proposed measures for the advancement of the industry. A report on the method of manufacture of Norwegian "old cheese" (gammelost) by K. Galgum is included.

[Dairying in Wiesbaden] (*Jahresber. Landw. Kammer Wiesbaden, 1910, pp. 81–114*).—This discusses the general conditions of dairying in Wiesbaden, and reports the annual yields of several hundred cows belonging to the Lahn, Simmental, Vogelsberg, and Westerwäld breeds.

The characters of Swiss butters, G. KOESTLER (*Landw. Jahrb. Schweiz, 25 (1911), No. 4, pp. 249–276*).—A comparison of the characteristics of 4 kinds of butters, made respectively from centrifuged cream, gravity cream, cream from centrifuged whey, and cream from whey which has been heated and acidified. The last-named product is known as Vorbruch. Analytical data and enzym tests are reported. The method of making Vorbruch butter is described in detail.

On the chemistry of rennet action, with special reference to the manufacture of Emmental cheese, O. ALLEMANN and W. MÜLLER (*Milchw. Zentbl., 7 (1911), No. 9, pp. 385–394*).—The amount of paracasein nitrogen in the curd was increased by adding acetic acid and by shortening the time of rennet action. It is suggested that some of this paracasein may be formed from noncasein protein, and that the cause of "gläsler" and other defects which sometimes occur with a high acid curd may be due to the mixing of paracasein formed from different proteins. Though a larger yield of cheese may be produced by shortening the time of fermentation no change in practice is recommended because of an accompanying deterioration in the keeping quality of the cheese.

Caerphilly cheese making in Ireland (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 4, pp. 669–675*).—A description of the method of making this medium hard variety of cheese, which had its origin in the village of Caerphilly, South Wales. Originally it was made from skim milk, but at present the market calls for a whole-milk cheese. There are also statistics on the cheese industry in Ireland.

The composition of sour pot-cheese made from cow's milk, G. BIRÓ (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No 3, pp. 170, 171*).—Analyses are reported of a Hungarian cheese made from spontaneously fermented cow's milk. It is much like Liptau cheese, except that the latter is ordinarily made from sheep's milk. Analyses of 130 samples gave the following percentages: Water 63.48 to 77.99, casein 13.2 to 26.39, fat 1.08 to 15.38, and ash 0.64 to 0.96 per cent, index of refraction of the fat at 40° C. to 40 to 44.6, and acidity 0.3 to 0.7 per cent.

VETERINARY MEDICINE.

Microbiology, C. E. MARSHALL ET AL. (*Philadelphia, 1911, pp. XXI+724, figs. 128*).—This work, prepared for use by agricultural and domestic science students, contains the following chapters: Morphology and culture of micro-organisms, including molds by C. Thom, yeasts by F. T. Bioletti, bacteria by W. D. Frost, invisible micro-organisms by M. Dorset, and protozoa by J. L. Todd; physiology of micro-organisms by O. Rahn, with a few paragraphs on protozoal nutrition by J. L. Todd; applied microbiology, under which are microbiology of air by R. E. Buchanan, micro-organisms in water by F. C. Harrison, microbiology of sewage by E. B. Phelps, microbiology of soil by J. G. Lipman, methods of soil inoculation by S. F. Edwards; the relation of micro-organisms to milk and some special dairy products by W. A. Stocking, and the acid-forming bacteria, and the relations of micro-organisms to butter and cheese by E. G. Hastings; microbiology of special industries, including dessication, evaporation, and drying of foods by R. E. Buchanan, heat in the preservation of foods by S. F. Edwards, the preservation of food by cold and chemicals and microbial food poisoning by W. J. MacNeal, the microbiology of alcohol and alcoholic products and manufacture of vinegar and fermented products by F. T. Bioletti, and manufacture of vaccines of antisera and other biological products related to specific infectious diseases by W. E. King; microbial diseases of plants by W. G. Sackett; and microbiology of the diseases of man and animals, including methods, channels of infection, immunity, and susceptibility by E. F. McCamp-

bell, microbial diseases of man and animals by various authors, and control of infectious diseases by H. W. Hill.

Microbes and toxins, E. BURNET (*Microbes et Toxines. Paris, 1911, pp. XI+349, figs. 71*).—The various chapters of this book deal with the general functions of micro-organisms; the carbon and nitrogen cycles; the micro-organisms of the human body; the form, structure, and physiology of micro-organisms; the pathogenic micro-organisms and infection; inflammation and phagocytosis; the pathogenic protozoa; the filterable viruses; toxins and endotoxins; tuberculin and mallein; immunity; anaphylaxis; applications of bacteriology to diagnosis, etc.; vaccines and serums; and chemotherapy.

The book has an introduction by É. Metchnikoff.

A veterinary dissection guide, S. SISSON (*Columbus, Ohio, 1911, pt. 1, pp. VI+54; rev. in Amer. Vet. Rev., 40 (1911), No. 3, pp. 385, 386*).—This first part is devoted to the joints, muscles, and viscera of the horse. It gives instructions for dissection, including care of the part being dissected, instruments to be used, clothing to be worn in the dissecting room, steps in dissecting each region, etc. The work is interleaved with blank pages for notes or sketches by the student.

Operative technique.—The value of habit, K. W. STOWDER (*Amer. Vet. Rev., 39 (1911), No. 5, pp. 552–555*).—A discussion which is treated under the following heads: "(1) The sterilization of the instruments and dressings, (2) the disinfection of the operative area, (3) the disinfection of the operator's hands and arms, and (4) the operative procedure."

Can the fact that animals become accustomed to ammonia gas be explained anatomically? E. SEIFERT (*Arch. Hyg., 74 (1911), No. 2–3, pp. 61–72; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 23, p. 958*).—The animals under test were kept for 8 hours daily in a respiration apparatus which contained a uniform amount of ammonia at all times. It was found that animals could acquire a tolerance to from 2 to 4 times the amount which is usually set down as the maximum. Anatomical changes could not be noted.

Memoranda on poisons, T. H. TANNER, revised by H. LEFFMANN (*Philadelphia, 1911, 11. ed., rev., pp. VIII+167*).—In this eleventh revised edition, among the additions are notes on synthetics used as substitutes for morphin. The work is meant primarily for those engaged in actual medical practice.

Transactions of the International Veterinary Congress at The Hague (*Trans. IX. Internat. Vet. Cong. The Hague, 3 (1909), pp. 344; 4 (1909), pp. 246*).—The first volume contains the proceedings of the opening, closing, and general meetings. The second continues the report of the work of the sections on public veterinary medicine (control of food), veterinary pathology and bacteriology, practical veterinary medicine, zootechny and veterinary hygiene, and tropical diseases (E. S. R., 25, p. 282). For other reports see a previous note (E. S. R., 24, p. 280).

Yearly report of the official veterinarians of Prussia for 1908, NEVERMANN (*Veröffentl. Jahres-Vet. Ber. Tierärzte Preuss., 9 (1908 [pub. 1910]), pt. 1, pp. VI+149, pls. 17*).—This volume contains reports and discussions on anthrax, symptomatic anthrax, rabies, game and bovine diseases, glanders, inflammation of the brain and spinal cord in horses, lung plague, sheep pox, dourine in horses, vesicular eruption (exanthema vesiculosum coitale) in horses and bovines, scabies in horses and sheep, erysipelas in hogs, swine fever and swine plague, fowl cholera and fowl plague, and influenza and strangles in horses.

Statistical report of the Royal Veterinary High School at Berlin for one year (1910–11), R. EBERLEIN (*Arch. Wiss. u. Prakt. Tierheilk., 38 (1911), No. 1–2, pp. 1–43*).—A report from April 1, 1910, to March 31, 1911, in regard to the activities of the anatomical institute, medical and surgical clinics and poly-

clinics for large and small domestic animals, ambulance service, the pathologic institute, and the hygienic institute.

Annual report of the civil veterinary department, Burma, for the year ending March 31, 1911, T. RENNIE (*Ann. Rpt. Civ. Vet. Dept. Burma, 1911, pp. 5+29, pl. 1*).—This report includes accounts of veterinary instruction, the occurrence and treatment of contagious diseases, etc.

Polyvalent hemolytic serum, J. NOWACZYNSKI and J. LECLERCQ (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 33, pp. 432, 433; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 1–2, p. 12*).—Polyvalent, hemolytic sera were prepared by repeatedly injecting subcutaneously the same amounts of erythrocytes from men, horses, bovines, sheep, and guinea pigs into rabbits. The production of the hemolytic sera presented no difficulty, but this was not the case with the hemolysin for the various kinds of blood corpuscles. The largest amount of hemolysin was specific for horse's and sheep's blood, and the least for the man, pig, and guinea pig.

An apparatus for determining the viscosity of serum and other animal fluids, L. VON LIEBERMANN (*Biochem. Ztschr., 33 (1911), No. 1–3, pp. 218–221, figs. 3*).—A description and illustration of an apparatus with which it is possible to determine the viscosity of fluids according to the methods of Coulomb, Helmholtz, Margules, etc.

Haptines in bovine serum and in cows' milk, H. KOPF (*Über Haptine im Rinderserum und in der Rindermilch. Inaug. Diss., Univ. Bern, 1909, pp. 24; abs. in Milchw. Zentbl., 7 (1911), No. 2, pp. 94–95*).—Hemolysis was never found to be attained with cows' milk, and, according to this, complement is not present. On the other hand, complement was always found to be present in colostrum, and was most active directly after parturition. The diminution of complement went hand in hand with the diminution of the cellular elements in milk. In the first stage after parturition ambocepter was also present, but after this it quickly vanished.

The preparation of antitoxin, E. J. BANZHAF (*Bul. Johns Hopkins Hosp., 22 (1911), No. 241, pp. 106–109*).—This article has special reference to the methods used for producing concentrated antitoxins by fractionation and the quantitative changes in the protein in serum of horses in the course of immunization (E. S. R., 24, p. 779).

Feeding and immunity in hemorrhagic septicemia and rinderpest, F. S. H. BALDREY (*Jour. Trop. Vet. Sci., 6 (1911), No. 2, pp. 158–168*).—In regard to hemorrhagic septicemia the author points out as a result of his experiments that of "bovines which ingest virulent hemorrhagic septicemia material in relatively small quantities 7.1 per cent contract the disease; of the remaining 92.9 per cent there are 84.7 per cent immune to it. The probable method of contracting the disease by ingestion would appear to be when an injury to the mucous membrane of the mouth has occurred and then infection amounts practically to a subcutaneous inoculation. This result has an important bearing on natural immunity and may account for the numbers of animals which in the plains resist infection."

The virus of rinderpest, according to the author, is contained in the red corpuscles and is not present in the plasma of the blood when hemolysis has not taken place. Theiler's results are therefore confirmed. A clear serum was incapable of producing the disease.

Anaphylaxis produced by an alkali albumin or acid albumin, G. MORUZZI and G. REPACI (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 9, pp. 398, 399; abs. in Ztschr. Immunitatsf. u. Expt. Ther., II, Ref., 2 (1910), No. 11, p. 212*).—When guinea pigs were sensitized with alkali albumin obtained from serum and then injected with a dialized serum, 55 per cent of them were rendered

anaphylactic. This was, however, not the case when a reinjection of alkali or acid albumin was given. When the guinea pigs were sensitized with acid albumin and reinjected with alkali albumin and dialized serum, 100 per cent of them became anaphylactic. Only 50 per cent became anaphylactic when acid albumin was reinjected.

The work is being continued.

Is eclampsia the result of anaphylaxis, J. Fëllander (*Ztschr. Geburtsh. u. Gynäkol., 68 (1911), No. 1, pp. 26–46; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 23, p. 954*).—Guinea pigs could not be sensitized with placental or fetal extracts or with milk from the same animal. It was also not possible to sensitize passively a guinea pig with eclampsia serum against the amniotic fluid of placental extract of man.

Pure cultures of amebæ parasitic in mammals, Anna W. Williams (*Jour. Med. Research, 25 (1911), No. 2, pp. 263–283*).—"Successive pure cultures of certain strains of parasitic amebæ may be easily obtained by using as food sterile brain, liver, or kidney tissue freshly removed from the normal guinea pig, rabbit, or dog. Morphologically the individual amebæ in these cultures do not differ essentially from those of the same species growing in the intestines of mammals. Certain characteristics, namely, large size, marked motility, clearly differentiated and highly refractive ectoplasm, nucleus poor in chromatin and situated near periphery of endoplasm, endoplasm showing 2 or more vacuoles and containing 2 too many red blood cells, which as a whole have been pronounced by others to be of use in differentiating pathogenic from nonpathogenic forms in the human intestines, have been shown by this study to be possessed by 2 species of amebæ in pure culture, one at least, in all probability, nonpathogenic for man. Hence the diagnostic worth of these points is rendered doubtful. Freshly removed tissue as food for amebæ promises to be of aid in obtaining pure culture of these organisms from cases of amebiasis, especially from bacteria-free amebic abscesses. Pure cultures of amebæ may be of use in helping to detect specific micro-organisms in infectious diseases of unknown origin."

A bibliography of 20 titles is appended.

The parasitic amebæ of man, C. F. Craig (*Philadelphia and London, 1911, pp. X+253, pls. 18*).—This work describes in detail the parasitic amebæ found in the human body and discusses the life cycle of each species, its distribution in the body, and its relation to disease.

In regard to the technique of Ascoli's precipitation reaction for detecting anthrax, A. Ascoli (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 22, pp. 389, 390, fig. 1*).—This method, which the author terms the thermo-precipitation method, consists of extracting the suspicious material with a physiological salt solution by boiling and then testing it against a specific precipitating serum.

The apparatus used for the purpose is illustrated and described in detail.

Arteriosclerosis in animals and its relation to arteriosclerosis in man, C. Otto (*Arch. Path. Anat. u. Physiol. [Virchow], 203 (1911), No. 3, pp. 352–404, pl. 1*).—The results of this histological study, which was made with digalen, adonidin, and strophantin on rabbits and dogs, show that the changes in the blood vessels of animals are equivalent to those which appear in sclerosis of the vessels in man and have the same etiology. The pathological changes noted in the animals under observation were not absolutely identical with those found in man, but the author believes this to be due to the peculiar construction of the arteries of the animals, the amount of substance required to produce the changes, and the time of exposure.

Some work with alcohol and nicotin will be reported on later. A large bibliography is appended.

The causative organism of foot-and-mouth disease, J. SIEGEL (*Illus. Landw. Ztg., 31 (1911), No. 96, p. 887, fig. 1; Berlin. Tierärztl. Wchnschr., 27 (1911), No. 50, pp. 909–915, fig. 1*).—A diplococcus was isolated by cultural methods usually employed for trypanosome work from the blood during the fever stage, the vesicles, and internal organs (heart and spleen) of animals suffering from foot-and-mouth disease, and had a close resemblance to the *Diplococcus pneumoniæ*, the *D. intracellularis*, and the gonococcus. These organisms which are called cytorrhyctes cocci took the anilin stains readily. The smaller ones were decolorized by Gram's method, and grew on agar and bouillon. By feeding the cultures to shoats small blebs were produced on the buccal mucous membrane of these animals. On feeding or injecting the organisms into bovines the fever characteristic of the disease was produced, followed by the formation of the characteristic blebs and erosions in the buccal cavity. The diplococcus by starving methods could be made to pass through a bisque filter, and could be made virile again with the usual enriching methods.

Protective and curative vaccination against foot-and-mouth disease, LÖFFLER (*Molk. Ztg. Berlin, 21 (1911), Nos. 51, pp. 601–603; 52, pp. 614–616*).—A detailed discussion of this disease with a statement of the methods for protecting and vaccinating against it. The disease is very prevalent at the present time in Germany, Russia, Austria-Hungary, France, Belgium, and the Netherlands.

The prevailing German conditions are described in detail.

Comparative investigations of methods for diagnosing glanders, L. DE BLIECK (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 5–6, pp. 418–453; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 28, p. 509*).—As glanders is of common occurrence in some parts of India, the author conducted a number of tests with the ophthalmo (using crude mallein), subcutaneous, agglutination, and complement fixation methods.

The ophthalmo reaction was found to be a good one and is given the preference over the subcutaneous test. The agglutination and complement fixation tests seemed to be good diagnostic methods, but for use in the Tropics they need still further investigation. The ophthalmo reaction has no effect upon a superseding skin test, but when the order of reactions is reversed, some discrepancy seems to occur. The ophthalmo reaction was found to be very intense in chronic cases.

Autopsies confirmed the above findings.

The control and eradication of glanders, C. D. MCGILVRAY (*Amer. Vet. Rev., 40 (1911), No. 2, pp. 179–194, fig. 1*).—In a clinical examination for glanders the author points out that the condition of the submaxillary glands should always be noted, as an indurative bosselated condition of these glands must be regarded with suspicion. Much stress must be also laid upon the importance of recognizing occult cases of glanders.

In the Dominion of Canada there has been a steady decrease in the prevalence of the disease since 1905, when of 1,747 horses tested 871 were destroyed, 365 being clinical cases. In 1911, 249 horses were tested, and up to August 19 no cases of glanders had been discovered.

All clinically affected horses prior to injection had temperatures over 102° F., and post-injection temperatures 2.5° higher. The author classifies ceased reactors as follows: (A) Pseudo-ceased reactors, and (B) authentic or actual ceased reactors. A ceased reactor case is used for illustrating some of the above points and is accompanied by the results of a detailed discussion of the findings of a necropsy.

In determining the thermal reaction the author considers "that where the temperature recorded at intervals of 2 hours from the eighth to the twentieth

hour after injection does not reach and exceed 2.5° over the highest initial temperature within a normal range, and is unaccompanied by a definite typical reactionary swelling at seat of inoculation or marked constitutional disturbance, more especially where the acme has been reached before the twelfth hour after injection and begins thereafter to recede to the normal range, it is not a characteristic reaction from glanders infection. . . . When the thermal reaction reaches and exceeds 2.5° with the rise of temperature maintained from 8 to 20 hours after injection, presenting the highest peak from the twelfth to the eighteenth hour, associated with a reactionary infiltration at seat of injection, even in the absence of any marked constitutional or organic disturbance, it indicates a glanders infection."

Malta fever in France, LAGRIFFOUL and ROGER (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 12, pp. 800–802; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 13–14, pp. 328, 329*).—Malta fever occurs in France quite frequently, and not only in the southern departments (Aude, Bouches-du-Rhône, Vauchise, Hérault, and Gard) but also occasionally in the northern part of France (Lyon and Paris).

The diagnoses in these cases in man were made chiefly on the basis of the agglutination test. The direct etiological factor in most instances was the ingestion of infected goat's milk. Some of the goats which yielded this milk aborted, while others gave a positive agglutination test.

The rinderpest problem, A. R. WARD (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 7, pp. 337–343*).—A discussion of the rinderpest problem in the Philippine Islands. It is stated that the disease is prevalent in 71 municipalities in 20 Provinces in these islands.

In regard to rinderpest in east Asia, M. EGGEBRECHT (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 1–2, pp. 54–70, pls. 6; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 49, pp. 975, 976*).—A discussion of the epizootiology, symptoms, and prognosis of rinderpest, and the results of curative and protective vaccination as carried on by the author against this disease in the German possessions of east Asia.

Vaccination against rinderpest, RUSSLAND (*Veröffentl. K. Gsndhtsamt., 34 (1910), No. 5, pp. 120, 121; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 6, p. 48*).—For the purpose of combating rinderpest, which exists in the Asiatic possessions of Germany, sera have been obtained from oxen artificially immunized previously. The method used is the serum-simultaneous method in which the animals receive 3 cc. of virulent blood from diseased animals and then a corresponding amount of the serum in the shoulder or under the skin of the neck.

The percentage of loss when using the above procedure was from 1 to 2. As a curative treatment the serum method is rarely used.

Inoculation against rinderpest in India by the serum simultaneous method, R. C. COCHRANE (*Jour. Trop. Vet. Sci., 6 (1911), No. 2, pp. 134–155, charts 10*).—From this work with the serum simultaneous method and rinderpest in various places in India it is noted that apparently not so much danger of spreading the disease exists as is generally supposed, providing the usual precautions (disinfection, etc.) are taken. Taking the figures obtained for all of the animals inoculated (1,028) and which represent the various classes of military cattle in India, the following could be noted: "27.8 per cent as represented by the nonreactions had active immunity; 34.2 per cent as represented by the mild reactions had inherited immunity to a large degree; 38 per cent as represented by severe reactions and deaths had no immunity, active or inherited, and it is probable that these animals, if attacked by the disease naturally, and not treated with serum, would die." "During these inoculations there

was actually only one animal that died from rinderpest uncomplicated with any other disease. Seven died from rinderpest complicated with piroplasmosis and one from uremia."

The production and concentration of a serum for Rocky Mountain spotted fever, P. G. HEINEMANN and J. J. MOORE (*Jour. Amer. Med. Assoc., 57 (1911), No. 3, p. 198*).—The serum was produced by injecting 2 horses with the spotted fever virus.

The concentration of the virus thus obtained was found to vary with the animal infected. Successful attempts were made in concentrating the serum from the horse by the same method usually employed for diphtheric antitoxin. "The preliminary experiments on the value of immune horse serum as a curative agent were encouraging. They will be continued in the near future."

Treatment of tetanus with carbolic acid, J. HAJNAL (*Állatorvosi Lapok, 33 (1910), No. 15, pp. 173–175; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 16, p. 292*).—This form of treatment, which was first recommended by Baccelli for man, was tried by the author on a pregnant mare. At the outset 20 gm. of a 2 per cent solution of carbolic acid was given daily, and after 2 weeks the toxic spasms ceased. Fifteen days after the first symptoms appeared the animal foaled. The action of carbolic acid upon nerve tissue seemed to be in this case antitoxic.

The method was also used successfully in the case of umbilical infection in a suckling foal, to which the author gave 10 gm. of a 2 per cent solution subcutaneously. The point of infection was treated also with a 3 per cent carbolic acid solution, as well as per rectum with a 0.5 per cent solution.

In regard to the fixation of tetanus toxin, S. LOEWE (*Biochem. Ztschr., 33 (1911), No. 1–3, pp. 225–246*).—In addition to brain substance the author found that erythrocytes and bone marrow will bind tetanus toxin. The power to fix toxin decreases considerably when the fixing substance is heated. The gray substance of the brain was found to have a greater fixing property than the white substance, although the fixing property differed with the locality from which it was taken.

Tuberculosis (*U. S. Dept. Agr., Farmers' Bul. 473, pp. 23, figs. 13; Ottawa: Govt., 1911, pp. 31, pls. 13*).—This is a plain statement of facts regarding tuberculosis, especially prepared for farmers and others interested in live stock by the international commission of the American Veterinary Medical Association on the control of bovine tuberculosis. The publication is copiously illustrated with pictures of diseased animals and pathological preparations from such stock.

Combating tuberculosis in Belgium, G. MULLIE (*Ann. Méd. Vét., 59 (1910), No. 12, pp. 723–740*).—A report in regard to the activities in Belgium for the past 15 years.

Tuberculosis and tuberculin testing in the Dutch Indies, L. DE BLIECK and H. J. SMIT (*Meded. Dept. Landb. [Dutch East Indies], 1911, No. 2, pp. 11*).—A discussion in regard to the occurrence of tuberculosis in the East Indian buffalo and its detection with the tuberculin reaction.

Experimental transference of tuberculosis from man to bovines, A. EBER (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 4 (1908), No. 5–6, pp. 374–412; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 31, p. 556*).—Continuing previous work (E. S. R., 18, p. 278; 20, p. 380) an attempt was made to convey infection from 8 cases of human tuberculosis (in 3 cases from children) to bovines. Two strains of the bacilli out of the 8 examined were of the bovine type, in 4 cases the disease in man was produced by the human type of bacillus (in 1 instance with certainty and in 3 presumably so), and in the 2 remaining cases the classification was difficult.

Tuberculosis was conveyed positively in 7 out of the 8 instances. In one instance a goat was also infected (see also E. S. R., 23, p. 685; 24, p. 587).

In regard to tuberculosis of the muscles in man and domestic animals, M. HUNGERBÜHLER (*Über Muskeltuberkulose bei Mensch. und Haustieren. Inaug. Diss., Univ. Giessen, 1910, pp. 53*).—The nodules in bovines are chiefly present in the areolar and muscular tissue. In all instances the nodules were found to contain a bacillus which closely simulated the *Bacillus pyogenes*. Microscopically and macroscopically the nodes showed a closer similarity to pyobacillosis in hogs and pseudotuberculosis in sheep than to true tuberculosis.

The primary kidney changes as observed in tuberculous bovines which came to slaughter, E. MOSER (*Arch. Path. Anat. u. Physiol. [Virchow], 203 (1911), No. 3, pp. 434–451, figs. 6*).—A description and discussion of the histological and microscopical findings of the kidneys from tuberculous animals which came to slaughter.

A new method for staining the tubercle bacillus, BEYER (*Abs. in München. Med. Wchnschr., 57 (1910), No. 16, p. 882*).—This is a modified antiformin method, which has for its principle a fractional centrifugalization. The remaining particles are stained as usual.

Hemolytic reactions in tuberculosis, W. BEYER (*Ztschr. Tuberkulose, 16 (1910), No. 5, pp. 485–488*).—The author points out, as a result of examining 428 sera from various diseases, that an increase of lecithin in the blood serum is not only characteristic of tuberculosis but occurs in many other diseases. Aside from lecithin, a protein which is precipitable by alcohol also takes part in the hemolytic process.

Investigations in regard to the conjunctival reaction, M. MEYER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 10, pp. 232–234; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 47 (1910), No. 22–24, p. 736*).—The value of this reaction was determined with 150 bovines and Tuberculol D (Merck). The reaction occurred 6 hours after the injection, reached its height in from 12 to 24 hours, and went through its cycle in from 24 to 36 hours. In most cases the results of the reaction could be substantiated by the finding of a pathological condition. Only in extreme cases of tuberculosis was the reaction negative.

Comparative investigations on the thermal tuberculin test and the phymatin-ophthalmo reaction, W. ASSMANN (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 25, pp. 449–452*).—All animals reacting with the ophthalmo reaction were found on slaughter to be tuberculous, while with the thermal reaction only 75 per cent showed positive findings, 3.6 per cent questionable, and 21.4 per cent no reaction at all.

Experimental work with antituberculin, E. BERTARELLI and L. DATTA (*Centbl. Bakt. [etc.], 1. Abt., Orig., 58 (1911), No. 2, pp. 152–160; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 23, p. 953*).—By treating dogs and rabbits a serum was obtained which contained a large amount of antituberculin as detected by the complement deviation test. With the serum, however, no definite action upon the prognosis of experimental tuberculosis in guinea pigs could be noted. It furthermore had no influence upon skin reactions for detecting tuberculosis.

Antituberculosis immunity, E. LESOURD (*Hyg. Viande et Lait, 4 (1910), No. 10, pp. 532–540*).—The author, after discussing the Arloing intravenous vaccination method, gives his results as regards temperature variations and the effect on milk secretion. As concerns milk secretion, it was found that there is a temporary diminution in amount and a temporary change in composition.

Negative results obtained for immunizing against tuberculosis by way of the intestinal tract, J. COURMONT and A. ROCHAIX (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 6, pp. 397–399*).—The vaccines employed consisted of

old cultures of the bovine tubercle bacillus grown upon potato and heated for 6 hours at 65° C. The vaccine was administered to guinea pigs as an emulsion in installments of 15 cc., with the aid of a tube 15 cm. long and into the large intestine. A few drops of laudanum were given at the same time. To determine whether immunity was established either subcutaneous injections of virulent tubercle bacilli were given, or the virulent bacilli were introduced into the alimentary canal with an oesophageal sound.

All of the guinea pigs receiving virulent cultures were later found to be tuberculous. The injection of the vaccines seemed to be well borne by the guinea pigs, and did not produce any particular symptoms.

In regard to immunizing bovines against tuberculosis with von Behring's method, DAMMANN (*Arch. Wiss. u. Prakt. Tierheilk., 38 (1911), No. 1–2, pp. 44–98*).—In this report, which continues previous work[1] the conclusion is reached, on the basis of numerous tests with animals kept under ordinary farm conditions, that von Behring's bovo-vaccination method alone does not give calves a positive protection against either artificial or a later natural infection by the tubercle bacillus.

A contribution to von Behring's bovo-vaccination, W. EBELING (*Med. Krit. Bl. Hamburg, 1 (1910), No. 2, pp. 81–89; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, pp. 904, 905*).—This is a report of the result of vaccinating 4,261 calves according to von Behring's method, conducted under ordinary farm conditions but with the necessary antiseptic precautions. The author believes the immunity thus derived to be only relative and not absolute. Sixty of the vaccinated animals were brought to section, and out of these only 5 per cent showed tuberculosis.

The clinical aspect of Johne's disease and the avian tuberculin test, G. P. MALE (*Vet. Rec., 23 (1911), No. 1192, pp. 723–726*).—After describing the etiology, symptoms, and lesions of this disease the author gives his results in diagnosing and differentiating it with avian tuberculin from diseases in which the diarrhea is due to other parasites or other causes.

In all 55 animals were tested (2 herds), some of which came to slaughter. Almost all which were submitted to a necropsy showed evidences of Johne's disease. The only way of eradicating the disease seems to be on the basis of the avian tuberculin test and the isolation of the reacting animals whether they show symptoms or not. In regard to therapeutic measures, the author obtained the best results with cyllin given in diluted dram doses once or twice daily.

Etiology, prophylaxis, and therapeutics of parturient paresis, W. OTTE (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 24, pp. 429–433*).—A discussion in regard to the etiology, pathology, and treatment of this condition, which the author believes to be one of asphyxia (asphyxia puerperalis).

The treatment recommended consists of oxygen inhalations through a mask, or introudcing the gas directly and slowly into the jugular vein and under the skin. This is aided by injections of caffein-sodium salicylate. Where one is forced to use an air infusion, fresh air is pumped into the mammary gland and after 10 minutes it is allowed to escape and the gland again inflated. As soon as the condition of the animal improves, she is placed on her other side and later transferred to a well-ventilated room. She is not milked until from 5 to 6 hours after this treatment.

Practical notes upon some surgical affections of the passages of the cow's udder, HAMOIR (*Ann. Méd. Vét., 59 (1910), Nos. 2, pp. 89–99, figs. 4; 3, pp. 145–154, figs. 5; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 15, pp. 263,*

[1] Arch. Wiss. u. Prakt. Tierheilk., 34 (1908), No. 4, pp. 345–389.

264).—This condition is divided into 2 general classes, viz, (a) wounds and (b) occlusions. The former is again divided into superficial wounds, deep wounds, and milk fistula. The occlusions are subdivided into (a) atresia at the entrance of the canal (congenital papillomatosis and the presence of calculi); (b) atresia in the course of the canal (undescribable hardening of a focus and induration of a large portion of the canal); and (c) the membrane which closes the connection between the milk system and the canal.

Difficult parturition in the cow, C. R. EDMONDS (*Rhodesia Agr. Jour., 8 (1911), No. 5, pp. 692–698*).—The author discusses abnormal presentations of the fetus.

Contagious abortion in cattle, H. L. RUSSELL (*Science, n. ser., 34 (1911), No. 876, p. 494*).—The author states that, through the use of a culture of *Bacillus abortus* brought from Copenhagen, it has been shown by the complement deviation test that the disease as it occurs in this country is caused by the same organism as is found in Europe. This organism has been isolated from the fetuses from 5 herds in various parts of Wisconsin and the identity of the cultures established by the test.

An epizootic of abortion, etc., in cows, K. KOVARZIK (*Allatorvosi Lapok, 33 (1910), Nos. 42, pp. 495–500; 43, pp. 507–510; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 26, p. 467*).—In small barns the author found that from 3 to 28 per cent of the animals aborted, and in the larger barns from 4 to 80 per cent. At the beginning of the epizootic the slinking began at about the sixth month with no premonitory symptoms present to indicate what might take place. Aside from the Bang-Stribolt bacteria other bacteria were detected in the vaginal secretion, but negative results as regards bacteria were obtained with the fetuses. The incubation period was longer than from 8 to 10 weeks. Injections of carbolineum and some vaccines were found not to be efficient during this epizootic.

Colibacillosis or diarrhea of young animals, VAN DER HEYDEN (*Ann. Méd. Vét., 59 (1910), No. 1, pp. 13–26, fig. 1; abs. in Vet. Rec., 23 (1910), No. 1153, pp. 94, 95*).—Observations were made with calves, and from the results the author considers the conclusion drawn by Poels in 1899, that the disease is produced by a virulent form of *Bacillus coli*, is correct. He dwells at length on the channels of infection, stating that the umbilicus is one of the most common places before, during, and after parturition. The alimentary tract also, according to the author, is as important as the umbilicus, both before and after parturition. Before parturition the calf probably ingests a portion of the amniotic fluid. The prophylactic and curative measures are discussed. The latter includes the serum treatment of the disease.

Paratyphoid B bacteria in slaughtered calves having miliary necrosis of the organs, H. LEDSCHBOR (*Der Paratyphus B bei geschlachteten Kälbern mit miliaren Organnekrosen. Inaug. Diss., Univ. Bern, 1909, pp. 49*).—The various organs of 26 apparently healthy calves which came to slaughter were examined for the presence of necrotic areas. Fifteen of the animals were given a very thorough microscopical and bacteriological examination, as a result of which the author points out that it is a common occurrence to see miliary and submiliary foci in the liver, spleen, and kidneys of calves, and these are often accompanied by affections in the lower section of the lungs. A few calves which were pronounced healthy while living were found to have had septicemia with a swelling of the body parenchyma and with an icteroid condition of the flesh on slaughter.

The causative organism of the disease was found to be the paratyphoid B bacillus. The detection of this condition during meat inspection and the relation of such meat to public health is discussed in detail.

Nodular disease of the intestines of cattle, W. JOWETT (*Agr. Jour. Union So. Africa, 2 (1911), No. 5, pp. 581–587, figs. 2*).—While nodular disease of the intestines of sheep is widely spread throughout South Africa, the author reports that but little attention appears to have been paid thus far to an almost identical nodular disease in the intestines of bovines, which is met with quite frequently in Capetown and the neighboring districts in the Cape Province. Whether the parasite concerned in South Africa is *Œsophagostomum inflatum* or *O. radiatum* has not been determined.

The treatment of redwater in cattle with trypanblue, A. THEILER (*Agr. Jour. Union So. Africa, 2 (1911), No. 5, pp. 562–569*).—Following a brief review of the subject, the author reports personal investigations which confirm earlier reports of the value of trypanblue in controlling and reducing the danger resulting from the artificial immunization of imported cattle against redwater. He considers the advantage of the drug treatment against redwater to lie in its use in the artificial immunization of imported cattle against the disease. It is pointed out that in immunizing cattle against *Piroplasma bigeminum* care must be taken that *Anaplasma marginale* also is not inoculated, since it can not be successfully dealt with by the trypanblue treatment.

Some observations on the blood of dairy cows in tick-infested regions, R. P. HIBBARD and D. C. NEAL (*Jour. Infect. Diseases, 9 (1911), No. 3, pp. 324–342*).—The authors' observations of the blood of 15 animals in a dairy herd gave results which, when compared with those of other observers, showed some marked differences, the most apparent of those noted being as follows: "The number of whites is appreciably larger. The number and percentage of polynuclears are smaller. The number and percentage of lymphocytes are larger. Other differences, though not so apparent and possibly of very little value, are noted as follows: The number and percentage of mast cells have decreased, while the number and percentage of eosinophiles and mononuclears have increased."

These same differences were observed when the animals were further examined at various times and over a period of 2 years, and when the results were compared with the results with a set of 15 animals from the general herd. Similar differences were observed in 41 cows in the general herd, and in 5 Ayrshire heifers imported from Pennsylvania and examined 30 days after having been immunized.

Directions for constructing a vat, and dipping cattle to destroy ticks, H. W. GRAYBILL and W. P. ELLENBERGER (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 183, pp. 15, fig. 1*).—This circular gives directions for preparing arsenical dips and for dipping cattle, and plans and specifications for the construction of a suitable dipping vat. It has been prepared to meet the need for such information in connection with the work being done by the Bureau of Animal Industry in cooperation with the state and local authorities in the eradication of the cattle tick.

Oxidation of arsenites to arsenates in cattle-dipping tanks, W. F. COOPER and G. A. FREAK (*Jour. Agr. Sci., 4 (1911), No. 2, pp. 177–181*).—The authors confirm the results of Brünnich[1] as to the oxidation of arsenites to arsenates, the reaction having taken place in the presence of wood tar and also of cresylic acids. See also a previous note by Fuller (E. S. R., 26, p. 174).

A simple, effective, and inexpensive method of treating the arsenical dipping solution before emptying vat for cleaning, W. H. DALRYMPLE and A. P. KERR (*Louisiana Stas. Bul. 132, pp. 3–8, figs. 2*).—The authors find that the danger of contaminating the water supply or vegetation through the disposal

[1] Rpt. Austral. Assoc. Adv. Sci., 12 (1909), pp. 129–133.

of the arsenical dipping solution "may be minimized or entirely prevented by the addition of commercial copperas, after the solution has been rendered excessively alkaline through the addition of air-slaked lime. The clear solution left on top, after the addition of the copperas solution, should contain no arsenic, and may, with safety, be pumped or siphoned to any convenient place; and the sediment remaining buried in a small hole dug for the purpose. . . . This method is simple, effective, and inexpensive, and if adopted, may be the means of preventing casualties from the careless disposal of the poisonous arsenical solution."

Notes on a trypanosome found in a sheep tick, and its probable connection with the disease known as louping ill, C. E. BISHOP (*Vet. Jour., 67 (1911), No. 438, pp. 709–715, fig. 1*).—The author reports finding a trypanosome in ticks taken from sheep. Up to the present time, however, all examinations of blood or organs of diseased sheep have failed to show the presence of the same form.

An infectious foot disease of sheep, A. THEILER (*Vet. Jour., 67 (1911), No. 437, pp. 659–663; Agr. Jour. Union So. Africa, 2 (1911), No. 1, pp. 29–32, pls. 2*).—A foot from each of 2 sheep were examined for the cause of lameness in a flock at Rietvlei near Johannesburg, South Africa.

The disease first manifested itself above the hoof, and later involved the hoof itself, where it caused deformity in the growth and length of the horn of the foot, and an ulceration or a thickening of the matrix of the coronary band. The necrosis bacillus was absent in these and other cases examined, but a coccus was noted which was gram positive, grew on agar slants as transparent droplets the size of a pin head which when reinoculated on agar formed transparent films. The disease could be reproduced when a pure culture was inoculated.

The treatment used was a thorough cleaning of the wound, preferably by means of warm water and a disinfectant, such as 3 per cent carbolic acid, and a dressing of the wound by means of a disinfecting and astringent ointment. A cheap and effective ointment is suggested, consisting of powdered copper sulphate, 10 parts, fat, 70 parts, and Stockholm tar, 5 parts. "When the ulcer has penetrated into the matrix of the hoof and the horn becomes detached, it is advisable to cut it away and to clean and dress the wound underneath . . . When a luxuriant growth or unhealthy granulation develops, cauterizing with nitrate of silver can be recommended."

Experiments with Krafft's vaccine against hog cholera, J. KÖVES (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 49, pp. 973, 974*).—In these tests, which were made for the purpose of determining the protective and curative properties of this vaccine, 132 healthy pigs from 2 weeks to 4 months old and having an average weight of 17 kg. were kept in infected quarters. Of these (a) 8 were kept as controls, (b) 10 were injected with 4 cc. of Krafft's vaccine on July 2 and 14 (protective vaccination), (c) 10 received 10 cc. of the vaccine after natural infection had set in (curative treatment(, (d) 8 received 2 cc. of hog-cholera virus subcutaneously, and (e) 96 received 2 cc. of hog-cholera virus in various parts of the body and 10 cc. of hog cholera immune serum under the skin.

The receptive mortality was for (a) 75, (b) 80, (c) 60, (d) 87.5, and (e) 9.41 per cent.

Do complications of swine plague and hog cholera occur? KOEPPEN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 49, pp. 974, 975*).—The author believes that the pectoral form of swine plague is a metastatic infection of the lungs which originates from the intestines of animals affected with hog cholera. According to this, the diseases must be considered identical.

In regard to accidents occurring during vaccination, E. LECLAINCHE (*Rev. Gén. Méd. Vét., 18 (1911), No. 209–210, pp. 262–271*).—The author here reports the deaths of pigs which were traced directly to the vaccine used for protecting against hog erysipelas. The constitutional condition of the animals had much to do with the mortality.

New experiences with equine influenza, RIPS (*Ztschr. Veterinärk., 22 (1910), No. 11, pp. 505–509; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 8, p. 844*).—Attention is drawn to the fact that in some cases a petechial fever occurs with this disease in horses. The author points out that he was able to cope with this disease in 2 cases by using antistreptococcic serum (Gans).

The cause of equine influenza, J. BASSET (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 8, pp. 485–487*).—Equine influenza (pink eye, pasteurellosis; Lignière's, contagious pleuro-pneumonia, etc.) according to this investigator is produced by a filterable virus. He was able to reproduce this disease in 3 horses by inoculating the defibrinated blood, and in some instances the filtered blood, obtained from a typical case of this disease.

Equine piroplasmosis, A. PRICOLO (*Clin. Vet. [Milan], Rass. Pol. Sanit. e Ig., 34 (1911), No. 20–21, pp. 915–940*).—A summarized account, with a bibliography of 43 titles.

On Gastrodiscus ægyptiacus and Spiroptera megastoma, BERKÉ (*Centbl. Bakt. [etc.], 1. Abt., Orig., 58 (1911), No. 2, pp. 129–134, fig. 1*).—The author describes the case of a Kamerun horse which was reduced to extreme emaciation by large numbers of trematodes (*G. ægyptiacus*) and nematodes (*S. megastoma*) in the stomach and intestines.

Septic arthritis in foals, STEVENS and SMEAD (*Amer. Vet. Rev., 39 (1911), No. 5, pp. 556–559*).—The treatment of septic arthritis resolves itself into 2 phases, the prophylactic and curative. The greatest stress, according to the author, must be laid upon prophylaxis. Both methods are described in detail.

Blackhead (infectious entero-hepatitis or typhlo-hepatitis): A disease of young turkeys, W. JOWETT (*Agr. Jour. Union So. Africa, 2 (1911), No. 5, pp. 612–617*).—The author states that up to the present time he has met with this disease in turkeys only in Capetown and the Western Province. The disease was apparently introduced into one flock examined, by turkeys imported from America.

RURAL ENGINEERING.

Experiments with oil burning in boiler furnaces, E. W. KERR and H. A. NADLER (*Louisiana Stas. Bul. 131, pp. 3–61, figs. 7*).—Inasmuch as fuel losses in sugar factories are considered to be as often due to inefficient oil burning as to inefficient bagasse burning, the authors conducted boiler tests with oil which are reported, as well as a comparison of oil and bagasse burned together and separately.

"The average equivalent evaporation of water per pound of oil in tests where conditions were regulated to give best results, including 11 out of 23 tests, was 15.53. This is excellent practice.

"The average equivalent evaporation of water per pound of oil with the different forms of settings experimented upon were so nearly the same as to justify the conclusion that the different settings were practically equal in their efficiencies as regards evaporation. . . . The above conclusion adds weight to the contention that combustion chamber volume is the principal requirement for efficiency. . . .

"In the tests to determine the relative merits of burning oil in the same furnace with bagasse and in specially designed oil furnaces separate from

bagasse . . . the average equivalent evaporation per pound of wet bagasse burned alone in a Dutch oven was 1.63 lbs., whereas the equivalent evaporation per pound of wet bagasse burned in the same furnace with oil was 1.28 lbs., thus showing an evaporation per pound of bagasse 27.3 per cent greater when burned alone.

"The evaporation per pound of dried bagasse when burned alone was 2.65 lbs., as against 1.77 lbs. when burned with oil, an increased evaporation of 37 per cent due to burning the bagasse alone. These results are all based upon an assumed evaporation of 14.75 lbs. of water per pound of oil, this figure being based upon the average evaporation obtained in 26 boiler tests where oil was used as fuel. . . .

"In the tests . . . where oil was burned alone in the bagasse Dutch oven the boiler efficiency was very low, the average being 55 per cent, with an average evaporation from and at 212° of 10.93 lbs. of water per pound of oil. This result was obtained with the best air regulation it was possible to get and shows the advisability of keeping up the load with oil burned in oil furnaces when the bagasse supply ceases, due to the stoppage of the mill, rather than by burning oil in bagasse furnaces."

The road material resources of Minnesota, G. W. COOLEY (*U. S. Dept. Agr., Office Pub. Roads Bul. 40, pp. 24, pls. 6*).—This bulletin describes the geography, meteorology, and road administration of Minnesota, the rock formations and drift deposits of the State and their location, the use of iron ore roads and gravel deposits, and data as to the construction of experimental gumbo roads. Tests of rock samples, including sands and gravels, are included, which indicate that the products of the Minnesota quarries compare very favorably with similar material from other sections of the country.

"That portion of the State lying along the eastern and northeastern boundaries is well supplied with sedimentary and crystalline rocks, as is the entire Minnesota River Valley. The extreme southwestern part is rich in quartzite and the granite outcrops near the central portion form a base of supply that can never be exhausted. Where suitable road stone is scarce, gravel may be found, though in some portions requiring a considerable haul. The roads of the Red River Valley and the southern part of the State will be built of clay and sand and those of the extremely sandy portions of sand tempered with vegetable matter or clay, and improved with gravel where possible. A large marshy area in the northern part remains yet to be developed, but with the completion of the drainage systems now under consideration and being constructed, and the opening of these lands to settlement, material will undoubtedly be discovered for road purposes in sufficient quantities to supply all demands."

Highway improvement.—I, Construction and maintenance of earth, sand-clay, and oiled earth roads, and culverts, W. S. GEARHART (*Agr. Ed. [Kans. Agr. Col.], 3 (1910), No. 6, pp. 92, figs. 28*).—In this pamphlet may be found a discussion of such road matters as administration, location, drainage, grading, maintenance, dragging, sand-clay roads, oiling, culverts, and specifications for concrete masonry.

Some types of silos and equipment, W. A. LINKLATER (*Oklahoma Sta. Circ. 15, pp. 3–4, figs. 16*).—This circular illustrates and briefly describes the concrete block, King, wooden hoop stave, and iron hoop stave silos.

A squeezer for cattle, L. OGILVY (*Breeder's Gaz., 60 (1911), No. 9, p. 331, fig. 1*).—A branding chute which can also be used for inoculating, dehorning, and other purposes is illustrated and described. It differs from the ordinary style in that the bars are upright instead of longitudinal and a part of them can be removed to facilitate operations in branding or inoculating. The animal can

be held with very much less pressure than is necessary with the bars set lengthwise.

Poultry house construction and yarding, H. L. KEMPSTER (*Michigan Sta. Bul. 266, pp. 45–73, figs. 18*).—This bulletin discusses the location and construction of poultry houses. Plans for a commercial laying house, a farmer's colony house, and a portable colony house are illustrated and described.

Ice houses, L. C. CORBETT (*U. S. Dept. Agr., Farmers' Bul. 475, pp. 20, figs. 11*).—This publication treats of the advantages of a supply of ice for farm use, and gives directions for harvesting ice and constructing ice houses.

The differences in procedure between harvesting thin and thick ice are explained, as is also the manufacture of ice in metal cans and by a combination of natural and artificial means. The methods of storing ice which are described include inexpensive houses, masonry structures, refrigerators, ice chests, and combination houses for ice and dairies or for ice and fruit storage.

It is pointed out that an amply supply of ice is of even greater economic importance in the country than in the city home, and that in many sections of the United States a sufficient supply can be readily secured at reasonable cost.

The use of paint on the farm, P. H. WALKER (*U. S. Dept. Agr., Farmers' Bul. 474, pp. 22, fig. 1*).—This publication has for its purpose the calling of attention to the economic importance of painting farm buildings and farm equipment and gives nontechnical direction as to the purchase and use of painting materials. It discusses the following topics: Brushes and other implements, care of brushes, drying of paints, preparation of surfaces for painting, painting exterior woodwork, interior painting, painting of metal, mixing paints, composition of paints and their cost, whitewash, calcimine, and precautions to be observed in painting.

Public hygiene, T. S. BLAIR (*Boston, 1911, vols. 1, pp. VI+10+310, pls. 61, figs. 11; 2, pp. 8+311–644, pls. 64, figs. 19*).—These volumes constitute a summary and discussion of data based upon a personal study of the subject. General questions of hygiene, contagious diseases, and similar matters are discussed as well as a number of special topics, including hotels, lodging houses, and public buildings; school inspection and college sanitation; slums and town nuisances; special rural hygiene and sanitation; home hygiene and interior sanitary installations; pure food and drugs; public carriers and sanitation; and laboratory methods and sanitation.

The author includes a list of contributors and collaborators.

RURAL ECONOMICS.

The place of economics in agricultural education and research, H. C. TAYLOR (*Wisconsin Sta. Research Bul. 16, pp. 93–130, figs. 19*).—This is a research bulletin in which is presented a studied discussion of the scope of agricultural economics, its place in agricultural education and research, and the methods applicable to the study of economic problems in agriculture.

The function of economics, when applied to agriculture, as distinguished from physical and biological forces, is characterized as "to make clear the economic forces with which the farmer has to deal and to develop methods of ascertaining what to produce and how to produce it in order to secure maximum net profits for the farmer and maximum well-being for the nation." The methods applicable to the study of economic problems in agriculture are described as historical, geographical, statistical, accounting, and experimental. A number of concrete illustrations are submitted, for instance, charts showing the shifting of the centers of wool production in the United States, from 1840 to 1900, to illustrate the operation of the economic forces which tend to push the pro-

duction of durable articles of high specific value, which require large areas of land, to regions distant from the market, and give the regions near the market to perishable articles of lower specific value which make smaller requirements for land per dollar's worth of product. Other charts illustrate the complementary and competing character of field crops in their demands upon the time of the farmer.

An appendix gives 54 chapter headings for a course in agricultural economics.

The rural exodus in France (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 3, pp. 495–499*).—The extent of migration from country to town, the causes of the movement, and some attempts to stay the exodus are here discussed.

It is pointed out that in 1866 51.5 per cent of the total population in France were employed in agriculture and 43.5 per cent in 1896. The direct cause for the exodus is suggested to be the growing distaste for country life and a preference for the more showy attractions and supposed advantages of town life. Among the indirect causes much blame is attached to the system of military service which annually takes thousands of young men from the rural district to serve a certain time in a garrison town with the result that many of them never go back to the land, and the long periods of nonemployment entailed by farm work and the low wages earned by farm laborers. Other causes mentioned are absenteeism of landlords, the technical incompetence of farmers, and a dislike of hard manual toil among laborers, combined with a growing indifference and even hostility toward their employers.

What is considered the most important step taken by the French government so far to check the townward migration is the passage of a law in July, 1909, known as the "loi du bien de famille insaisissable." The measure in many respects resembles the American homestead law.

Systems of farming in central New Jersey, G. A. Billings and J. C. Beavers (*U. S. Dept. Agr., Farmers' Bul. 472, pp. 40, figs. 11*).—This publication discusses the prevailing systems of farming in central New Jersey and describes some of the methods followed by the more successful farmers where soil fertility and profitable farming have been maintained although the land has been farmed for more than 150 years. It also give suggetions based on a study of the agriculture of the region concerning cropping systems, the management of soils and crops, and the use of manures and fertilizers.

In giving detailed data as to income and expenses from records carefully kept by the owner of a typical tenant farm of 175 acres, it is shown that the net income for a 10-year period has paid the owner 7¼ per cent interest for 10 years on a valuation of $200 per acre, while the tenant who has operated the farm continuously on the share tenant system for 13 years, after hiring over half the labor and employing a housekeeper for a number of years, has saved on an average $500 per year above all expenses.

What size enterprise is best suited to the farmer? W. Böhmker (*Deut. Landw. Presse, 38 (1911), Nos. 90, pp. 1025, 1026; 91, pp. 1040–1042; 92, pp. 1049, 1050; 94, pp. 1071, 1072; 96, pp. 1090–1092*).—These are a series of articles discussing the relative cost and profitableness of large and small agricultural enterprises of various kinds, as related to capital permanently invested, cost of management, improvements, farm equipment, etc.

A better net price: The rights of the producer in the consumer's dollar, G. M. Twitchell (*Amer. Cult., 73 (1911), No. 49, p. 4*).—An abstract of an address before a meeting of the Massachusetts State Board of Agriculture December 7, 1911, in which the author claims that the combined agencies between the producer and consumer of farm products receive 65 cts. out of every dollar

paid by the consumer for such products. Some economic changes in the methods of marketing and disposal of farm products are advocated, it being contended that the establishment of public market places in every community so that the grower could display his goods and meet the consumer face to face would insure the grower a better price, bring about closer grading and choicer quality, educate the consumer to the superior value of fresh grown farm products and their right selection, inspire a determination to improve in quality and increase in quantity the crops sold, and lead to a specialization in production best adapted to the farm and local demand.

Selling without waste, R. SHACKLETON (*Country Gent., 76 (1911), No. 3068, pp. 2, 3, figs. 3*).—The advantages and practical merits of cooperative selling are illustrated in this article by showing some practical results accomplished by several fruit growers' associations in Michigan. Some of the advantages noted are greatly reduced transportation charges, better transportation facilities in the way of fruit trains, schedules, etc., higher prices for fruits with less cost of marketing, and a more uniform demand for special brands of fruits.

Organizing the farm for profit, W. J. SPILLMAN (*N. Y. Tribune Farmer, 11 (1911), No. 525, pp. 1, 11, figs. 3*).—The author discusses and illustrates the principles involved in so planning and organizing a farm as to make it yield the largest profit, among the essentials noted are greater diversifications, better distribution of labor, larger machinery, and better marketing methods.

Agricultural cooperation, J. S. CORBETT (*Co-operation [London], 5 (1911), No. 12, pp. 161–164*).—A paper read at the Small Holdings Congress recently held at the Crystal Palace, London, in which the following are among the phases of agricultural cooperation discussed and illustrated: Possibilities of cooperation, large tenants *v.* small holders, how to produce a skilled small holder, the middleman's profits, and the increase the consumer is being asked to pay.

How societies are benefiting their members (*Ann. Rpt. Agr. Organ. Soc. [London], 1910, pp. 48–51*).—In reply to a special inquiry by the Agricultural Organization Society, Limited, of the numerous affiliated societies asking for some instances of the benefits which have resulted to the members, the following are noted from the replies recorded: "We have done much to reduce the prices of implements and fertilizers. . . . We are helping to regulate the trade and prevent exorbitant prices being taken by local dealers. . . . We have very materially benefited our members by bulking orders and consignments, and thus obtaining the advantages of reduced cost of produce and lower quotations. . . . Better quality goods at less money."

[Mutual agricultural insurance, credit, and cooperative societies in France] (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 1, pp. 1–38*).—This is the report of the minister of agriculture, giving annual statistics and showing the development of mutual agricultural insurance societies in France for a period of years.

The total number of societies reported for 1897 was 1,484 and for 1910, 10,731. The live stock organizations numbered 1,469 in 1897 and had a membership of 87,072 with insurance valued at 59,168,334 francs; in 1910 they numbered 8,428 with a membership of 438,216 and an insurance valuation of 532,807,990 francs. The number of fire insurance societies increased from 1,208 on December 31, 1907, to 2,187 on September 30, 1910; the membership increased from 29,218 to 53,110 and the value of property insured from 254,755,365 to 508,374,563 francs within the same period. The number of mutual societies insuring crops against hail increased from 12 to 25 from 1898 to 1910. The membership increased from 16,812 to 44,677, but the capital representing the amount insured decreased from 28,499,456 to 28,159,854 francs. There were also 7 societies in 1910 against agricultural accidents, and 84 reinsurance socie-

ties. The state government contributed toward the formation and maintenance of the various societies 172,550 francs in 1898 and 7,896,450 francs in 1909.

Notes and statistical accounts are also given showing the work of other mutual agricultural insurance, credit, and cooperative societies.

Report of the working of cooperative credit societies in the Punjab for the year ending July 31, 1911 (*Rpt. Work. Coop. Credit Soc. Punjab, 1911, pp. II+2+2+16+XII*).—This report shows that the number of agricultural cooperative credit societies in the province increased during the year from 706 to 1,092, the membership from 38,555 to 51,705, and the working capital from 1,581,357 to 2,856,841 rupees (from $512,360 to $825,616) (E. S. R., 25, p. 188).

Sheep of shearing age on farms, and wool produced (*Bur. of the Census [U. S.] [Press Bul.], 1911, Dec. 11, folio*).—Statistics relative to sheep reported on the farms of the United States as a whole and its 9 main geographical divisions are reported, and summarized in the following table.

Sheep of wool-shearing age, fleeces, value, etc., in the United States, 1900–1910.

	Wool-bearing sheep.		Fleeces produced.				
	Number.	Average per farm.	Number.	Gross weight.	Weight per fleece.	Gross Value.	Value. per pound.
				Pounds.	*Pounds.*		*Cents.*
United States, 1910	39,644,046	65	42,320,580	289,419,977	6.8	$65,472,328	23
United States, 1900	39,852,967	52	43,999,229	276,567,584	6.3	45,670,053	17
Increase amount	−208,921	13	−1,678,649	12,852,393	0.5	19,802,275	6
Per cent	−0.5	.....	−3.8	4.6	.....	43.4	.....

It is explained that the excess in the number of fleeces over that of sheep is due in part to the fact that a limited number of sheep in some States are shorn twice during the year, and also to the fact that a large number of animals in all sections are shorn each spring before they are sold for slaughter.

Cotton production and statistics of cotton-seed products: 1910 (*Bur. of the Census [U. S.] Bul. 111, pp. 66, figs. 14*).—This bulletin estimates the value of the cotton crop of 1910 at $963,180,000 as compared with $812,090,000 for 1909, although the number of bales is only 16 per cent greater. The value of a 500 lb. bale, including the value of the seed, was $87.15 in 1910, as compared with $50.37 for 1904 and $30.22 in 1898. The value of cotton seed has increased from $13.80 per ton in 1906 to $27.40 per ton in 1910.

The reasons assigned for the larger crops in the localities reporting them for 1910 are an increased acreage encouraged by the high price of cotton, the planting of improved varieties, better seed selection, and, especially, better methods of cultivation.

Other data and statistics are given as to acreage and yield in the various States, average price at stated periods, the cotton production center, the cotton ginned and remaining to be ginned, the world's production, the stock on hand February 28, 1910, and the supply and distribution of cotton.

Agricultural statistics of Ireland, with detailed report for the year 1910, T. P. Gill (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1910, pp XXXIX+147*).—This is the annual report on agricultural statistics of Ireland for the year 1910 in which detailed and comparative records are presented for a period of more than 50 years showing the division of land by counties and provinces; the growth of pasture land and shrinkage of crop areas devoted to the several classes of crops, together with their products and average yield per acre; the

number of holdings, their size, and the number owned and tenanted; the number, kind, age, etc., of live stock; together with other detailed data pertaining to agriculture.

The acreage under "corn crops," which includes wheat, oats, barley, rye, beans, and peas, has decreased from 3,099,401 acres in 1851 to 1,300,079 acres in 1910, or 58.1 per cent. "Green crops" (potatoes, root crops, vetches, cabbage, rape, etc.) and flax show a decrease of 501,055 acres or 33.1 per cent, while hay shows an increase of 1,175,179 acres or 94.3 per cent within the same period. The net decrease represents approximately the increase in area of pasture land.

The number of holdings not exceeding 1 acre increased from 37,728 in 1851 to 86,131 in 1910, with a total area estimated to amount approximately to 39,800 acres and a population of 84,799. Of the 555,125 persons holding land it is shown that about 15 per cent occupy plats of less than 1 acre, 10 per cent areas containing from 1 to 5 acres, 24 per cent areas containing from 5 to 15 acres, 22 per cent areas containing from 15 to 30 acres, 12 per cent areas containing from 30 to 50 acres, 10 per cent areas containing from 50 to 100 acres, and 4 per cent areas containing from 100 to 200 acres. In 1910 there were 350,794 holdings owned and 255,102 tenanted, an increase of 13,499 of the former and 1,430 of the latter over 1909.

[Agricultural data] (*Ann. Statis. Egypte, 3 (1911), pp. 253–284*).—This report of the minister of finance gives notes and statistical data as to the area and production of cotton grown in Egypt from 1895–96 to 1908–9, together with tables showing the number of natives and aliens occupying farms ranging from about 5 to 50 acres and over, the tillable area and amount cultivated, and the area, yield, etc., of the leading farm crops.

AGRICULTURAL EDUCATION.

High school agriculture without state subsidy, W. H. FRENCH (*Moderator-Topics, 32 (1911), No. 15, pp. 311–314*).—The purpose of this paper is largely to describe what has already been done in agricultural education in those States which do not grant a special subsidy to individual schools for the introduction of such courses. The States considered are Illinois, Indiana, Nebraska, Ohio, and Michigan.

The author concludes that secondary agriculture has hardly gone far enough for drawing definite conclusions, but that enough has been done to demonstrate certain things. Among these it has been clearly shown in each State that (1) there is an interest on the part of the people in agriculture as a subject of study, (2) agriculture correlates well with other science subjects, (3) intellectual power can be developed through it, (4) the lives of many young men are redirected and turned toward agriculture, and (5) practical results in farming processes in the community are secured.

The agricultural high school legislation needed, G. C. ROUND (*South. Planter, 72 (1911), No. 12, pp. 1376, 1378–1382*).—In this article the writer points out some of the difficulties encountered in organizing an agricultural high school at Manassas, Va., and makes some suggestions for bringing about better conditions, particularly with reference to the administrative features of such schools.

The place of the special secondary schools of agriculture in the educational system of the State of New York, H. J. WEBBER (*N. Y. Tribune Farmer, 10 (1911), No. 501, pp. 4, 6*).—The present system of agricultural instruction in New York and the ideal state system are here discussed.

The author holds that the most fundamental steps in agricultural education in New York at present are to see that agriculture is introduced as rapidly as possi-

ble into all of the high schools of the State, and that the courses are in a large measure independent of articulation with the state college of agriculture as probably four-fifths of the pupils who take agriculture will not attend college. It is maintained that there is a special place for a limited number of special schools of agriculture, but that they should not be considered local in their nature but should be state-wide in scope. The author's ideal system thus would be to insist that in general the pupil first attend the high school for a period, where he will come in touch with academic training and other vocations. If, after a certain time in the high school, he decides that agriculture is the profession he desires, he should then be sent to the special school of agriculture or to the college of agriculture, according to circumstances.

State aid to vocational education in Minnesota, D. D. MAYNE (*Minn. [Dept. Pub. Instr.] Bul. 29, 1911, pp. 50, figs. 11*).—This bulletin is made up chiefly of reports of each of the 10 schools receiving state aid under the Putnam act, and contains data as to courses of instruction, the school farm, extension work, manual training, and home economics, the text of laws relating to the teaching of agriculture and industrial work passed by the legislature of 1911, and a discussion of the general educational policy of the State with reference to vocational subjects.

Annual report of the inspector of state high schools of Minnesota, G. B. AITON (*Ann. Rpt. Insp. State High Schools Minn., 18 (1911), pp. 60*).—According to this report there are 73 high schools offering work in agriculture, besides the 10 under the Putnam act. Statistics are given concerning the latter schools covering such matters as expenditures and enrollment for agriculture, home economics, and manual training. It is stated that the weakest school has done good in the community, justifying its establishment, while the stronger schools have exerted an influence that almost deserves the term collegiate.

Extension work, 1911–12 (*Announcer Col. Agr. [Cornell Univ.], 1 (1911), No. 3, pp. 9–15*).—A detailed account of the extension work of the New York State College of Agriculture.

Teaching the farmer how to farm, D. G. FRENCH (*Canad. Mag., 36 (1911), No. 5, pp. 420–429*).—This is an account of the evolution of a practical system of agricultural education for the Canadian Provinces, beginning with the preparation of text-books, followed by the establishment of 2-year agricultural courses in connection with high schools in charge of graduates of the Ontario Agricultural College, and the present solution of the problem of agricultural education for the Provinces by the establishment of 14 district offices of the department, each in charge of a trained agriculturist whose entire services are available for the benefit of his district. The duties of these representatives are outlined and some of the work carried on in the past 3 years is described.

Farm and forest, edited by L. H. BAILEY (*Boston, 1911, pp. XXVIII+387, pls. 10*).—This is the third volume of the Young Folks Library, and comprises articles by different authors, most of which have previously appeared in farm journals, magazines, etc. The introduction is by L. H. Bailey and deals with the vocation of farming, and other subjects discussed include (1) Leadership on the Farm, by Kenyon L. Butterfield, (2) The Coming Boy of the Farm, by W. M. Hays, (3) The Farmer's Outlook, by Henry Wallace, (4) Practical Forestry, by Gifford Pinchot, (5) Growing Crops under Glass, by B. T. Galloway, and (6) The Advantages of a Vegetable Garden, by Eben E. Rexford.

The corn lady, JESSIE FIELD (*Chicago, 1911, pp. 107, pl. 1, figs. 24*).—The major portion of the book is devoted to letters written by the author to her father while she was a country teacher, and includes an account of her method of teaching agriculture in a rural school, farm arithmetic problems, language

work in connection with the teaching of farm and home subjects, corn judging, and a score card for bread.

Crop exhibits, A. M. TEN EYCK (*Agr. Ed. [Kans. Agr. Col.], 3 (1910), No. 4, pp. 13, figs. 16*).—The object of this publication is to offer suggestions in the preparation of crop exhibits at county and state fairs, state corn shows, etc. The suggestions pertain in particular to bundle samples of grain and grasses, threshed grain, and ear corn, and illustrations are given of properly prepared bundle samples.

Chapters in elements of agriculture.—IV, A soil primer, L. E. CALL (*Agr. Ed. [Kans. Agr. Col.], 3 [1911], No. 12, pp. 27, figs. 8*).—The 6 lessons included in this pamphlet on soils deal with its rock particles, plant material, moisture content, relation to heat and air, and life. There are 2 practical exercises following each lesson adapted to either the laboratory or the field. References to literature on the soil appear with almost every lesson.

Soil drainage, A. G. MCCALL (*Agr. Col. Ext. Bul. [Ohio State Univ.], 7 (1911), No. 4, pp. 4–15, figs. 14*).—This bulletin contains 4 practical exercises in soil drainage and a brief discussion of (1) the benefits of good drainage, (2) the drainage of low, level, and rolling land, and (3) drainage practice.

Suggestive outlines for agricultural work in rural and village schools.—Corn, L. G. ATHERTON (*Normal Teacher [Madison, S. Dak.], 1 (1911), No. 5, pp. 11, figs. 5*).—This publication has been prepared by the South Dakota State Normal School to assist rural and village teachers in the presentation of lessons on corn. It is the first of a series to be issued dealing with some special topic of interest to teachers of agriculture. The practical exercises have been so selected and prepared that the teacher can carry them out without special apparatus.

Chapters in elements of agriculture.—VI, A wheat primer, L. A. FITZ (*Agr. Ed. [Kans. Agr. Col.], 3 [1911], No. 17, pp. 23, figs. 4*).—There are 7 elementary lessons on wheat in this primer, dealing with such matters as the seed bed, seed selection, wheat diseases, and insect pests, marketing, and milling.

Orchard fruits, A. W. NOLAN (*W. Va. School Agr., 2 (1911), No. 2, pp. 26–44, figs. 14*.—The 7 lessons outlined deal with fruit growing on the farm, selecting and planting the trees, types of fruit, judging apples, common orchard pests, and packing and storing fruit. Each lesson is accompanied by practical exercises. A few books on fruit culture are suggested.

Forestry in nature study, E. R. JACKSON (*U. S. Dept. Agr., Farmers' Bul. 468, pp. 43, figs. 13*).—The plan of this publication, which is a revision of a special circular of this office (E. S. R., 22, p. 197), is to suggest definitely what tree studies, exercises, and supplementary readings may be used each term in the first 6 years of the elementary schools, and to make these lessons progressive and logical. There is in addition to the course of study a discussion of the aims of nature study and the methods of teaching it, suggestions for supplementary experiments, field trips, and the use of illustrative material, a key to the common kinds of trees, and a bibliography of the books referred to in the text.

Essentials of biology, G. W. HUNTER (*New York, Cincinnati, and Chicago, 1911, pp. 448, pl. 1, figs. 368*).—Following a brief treatment of the influence of environment on plants and animals, the school year is begun with a study of the flower and fruit, together with the related topic of insects in their relation to flowers, these being taken up in the fall when material is abundant. Considerable emphasis is placed on the subject of fruits useful to man, plant breeding, and other topics of economic importance. Roots are then considered, and the significance of osmosis is explained in detail. The subject of soils and the relation of bacteria to crop rotation are next taken up. A discussion of the

stem introduces the idea of transportation of material. Considerable emphasis is placed on the need of forest conservation. Then follows a discussion of various forms of the simplest plants, and particularly of the economic relation existing between plants and animals.

In the study of animal life, a number of types have been introduced with a view to selection of material. A final chapter treats of health and disease from the standpoint of private and public hygiene.

Concrete problems, related when possible to the daily life of the pupil, have been used throughout, stated in the form of either laboratory exercises or suggestions. At the end of each chapter is a list of books which have proved useful either as reference reading for students or as aids to the teacher.

A laboratory manual for the solution of problems in biology, R. W. SHARPE (*New York, Cincinnati, and Chicago, 1911, pp. 352, figs. 86*).—An attempt is made to develop a series of solutions of problems in biology, primarily physiological in their import, but with significant references to man at every opportunity. The main divisions of the subject considered are (1) the nature and needs of living matter, (2) physiological processes and adaptations in plants, (3) the biological interrelations of plants and animals, (4) the most successful animals, insects, and their relation to man, and (5) adaptations for digestion, circulation, absorption of foods, respiration and excretion.

The manual is intended to accompany the treatise by Hunter noted above.

Bird studies for home and school, H. C. DE GROAT (*Buffalo, 1911, pp. 146, pls. 60*).—The purpose of this book is to present to teachers and to young people in school and at home a series of simple lessons on 60 common birds, the most of which may be seen in parks or woods, in city or country.

The Babcock milk test in schools (*Penn. State Col. Bul. 5 (1911), No. 5, pp. 18, figs. 5*).—This lesson has been prepared primarily to furnish suggestions to teachers in secondary schools. It presents the principles involved as well as the practice or mere mechanical operation.

Farm mechanics and drawing syllabus for secondary schools, 1911 ([*N. Y.*] *Ed. Dept. Bul. 500, 1911, pp. 32, pls. 10*).—This syllabus is designed to outline and direct the work that has been indicated as "mechanical drawing" and "carpentry and joinery," in the first high school year of the vocational course in agriculture. It takes up, besides farm mechanics and mechanical drawing, forge work, gasoline engines, farm implements, equipment for drawing and shopwork, and text and reference books and other publications.

Silage and silo construction, C. H. HINMAN (*Agr. Ed.* [*Kans. Agr. Col.*], *2 (1910), No. 4, pp. 72, figs. 18*).—A summary of available data on the place of silage in farm economy, the chemistry of silage and its effects on digestion, feeding silage to dairy cows, fattening cattle, sheep, horses, swine, and poultry, the ensilage of alfalfa, clover, cowpeas, and sorghums, handling corn for silage, and silo construction.

Road locating and building simplified, C. E. BRANDT (*Cumberland, Md.,* [*1908*], *pp. 106, pls. 6, figs. 13*).—The subject of road location and construction is presented in this book in a very elementary way by means of questions and answers.

Gardens and their meaning, DORA WILLIAMS (*Boston, New York, Chicago, and London,* [*1911*], *pp. IX+235, figs. 34*).—The aim of this volume is to show the importance of science in the use of the spade and hoe, and to urge that a garden for education may be in spirit a corner of the great world. Consideration is given to the location, soil, foes, and friends of the garden, and specific directions are furnished for growing beans, beets, cabbage, carrots, lettuce, onions, parsley, radishes, spinach, tomatoes, herbs.

Interim memorandum on the teaching of housecraft in girls' secondary schools (*London: Bd. Ed., 1911, pp. 71*).—Pending the consideration and issue of the full report of the consultative committee, to whom the Board of Education has referred the question of the place to be assigned to home economics in girls' secondary schools and the best lines on which to provide for its teaching, the board has prepared this memorandum as to what is being attempted in this subject by a few schools of various types. The memorandum sets forth and discusses the present condition of home economics teaching in girls' secondary schools as regards such phases as the organization of the work in science and home economics, correlation with science, methods of instruction, qualification of teachers, equipment, and the time allotments of typical high schools, secondary girls' schools, and secondary mixed schools. Typical syllabi of courses being followed in certain secondary schools and brief accounts of home economics teaching in secondary schools of the United States, Belgium, Denmark, France, Germany, Norway, Sweden, and Switzerland are appended.

A handbook of home economics, Etta P. Flagg (*Boston, 1912, pp. 98*).—This book, which plans to give a basis for the pupil to work from, consists of a series of lessons in cooking, serving, laundry work, etc., which "may be completed in one school year or in two, according to the frequency of the lessons. It is divided into two parts for the convenience of classes which devote two years to the subject." Questions at the end of each lesson suggest the principal points to be brought out.

Household decoration, Helen B. Young (*Cornell Reading Courses, Farm House Ser., 1911, No. 1, pp. 41–64, pls. 2, figs. 20*).—This bulletin, with an introduction by Martha Van Rensselaer, aims to review the principles underlying the problem of home decoration.

Household furnishing, Helen B. Young (*Cornell Reading Courses, Farm House Ser., 1912, No. 2, pp. 65–84, pls. 2, figs. 8*).—The topics considered in this pamphlet deal with the point of view in furnishing the home and its various parts.

A very real country school, B. H. Crocheron (*World's Work, 23 (1912), No. 3, pp. 318–326, figs. 5*).—This article describes the work that has been carried on during the past 2 years in the Baltimore County Agricultural High School, which is located in the country. The principal of the school is convinced of at least 3 things, viz: (1) That the vital school will be one placed where the demand for it is strong, (2) that experiments and demonstrations should be made on the farms of the community and not on the school farm, and (3) that a rural school of the new type takes the whole devotion of the man who would work it out.

Patrons' meeting, Ida A. Tourtellot (*Hampton Leaflets, 6 (1911), No. 5, pp. 12, figs. 7*).—This leaflet contains a suggestive outline for organizing and conducting a patrons' meeting with a view to bringing friends, parents, teachers, and children into closer relation with one another for the betterment of the school and its surroundings, the home, and the lives of the people.

NOTES.

Arizona Station.—Dr. W. H. Ross resigned as assistant chemist February 1 to accept a position with the Bureau of Soils of this Department.

California University and Station.—Frank E. Johnson, assistant in the soils laboratory, died January 12.

Florida Station.—H. E. Stevens, assistant in plant pathology in the Arkansas University and Station, has been appointed plant pathologist and has entered upon his duties.

Georgia College.—Recent appointments include J. E. Turlington as adjunct professor of agronomy and L. L. Jones as instructor in poultry husbandry, both in connection with the extension work, H. H. Rothe as instructor in veterinary medicine, in charge of the hog cholera serum plant, and R. M. Murphy as instructor in animal husbandry.

Idaho University and Station.—One-week movable schools were held during February at nine different points in southern Idaho, being conducted in cycles of three each and the instructors rotating from one school to another. The schools have been very successful, the registration ranging from 150 to 600.

The dairy department has been divided into two sections; G. E. Frevert has been appointed assistant professor of dairy manufactures and will have charge of the station work in that division, and E. V. Ellington, formerly in charge of field work in dairying, has been appointed assistant professor of dairy production, and will have charge of the dairy herd, the cow testing association campaign, and the work in animal nutrition.

The station has established a demonstration dry farm at Aberdeen in southeastern Idaho, where a tract of 80 acres of new land has been leased for a term of 15 years, and a modern farm cottage, machine shed, seed house, and barn have been erected. The farm will be conducted largely upon a cooperative basis with the Bureau of Plant Industry of this Department, and will be in charge of L. C. Aicher, who has been appointed superintendent.

Iowa College.—P. G. Holden has resigned as head of the department of agricultural extension, and R. K. Bliss has been made acting head.

Kansas College and Station.—Recent appointments include Perry Van Ewing as assistant to the president and assistant in the station, and Duncan Stuart as assistant to the dean of agriculture and assistant in dairying in the station.

Kentucky University and Station.—An extension division has recently been organized, a small poultry plant instituted, and a laboratory for the production of hog-cholera serum established under a state appropriation. John I. Claybrooke, feed inspector, is no longer connected with the station.

Louisiana University and Stations.—The university is cooperating with the State Board of Health, the State Department of Education, and this Department in operating an agricultural demonstration train of 11 cars for a two months' trip over the railroads of the State. Among the illustrative material which is being presented are exhibits from boys' corn clubs, a model concrete dipping vat, farm engines, canning outfits, and other agricultural machinery,

a collection of agricultural text-books, exhibits of pure-bred cattle and hogs, a health exhibit, and material pertaining to forage crops, insect pests, animal diseases, soils, fertilizers, feedstuffs, etc.

The new residence for the assistant director in charge of the North Louisiana Station has just been completed, at a cost of about $4,000.

Massachusetts Station.—George R. Pierce has been appointed assistant chemist.

Michigan Station.—William C. Marti and Arao Itano have been appointed assistant chemists.

Minnesota University and Station.—The university is encouraging the formation of boys' corn-growing contests, for which prizes aggregating $600 are available, in addition to a scholarship for one year at the school of agriculture which has been provided by a Minneapolis newspaper. The same journal is also inaugurating tomato-growing contests for the girls of the State, under the direction of the agricultural extension division of the university, and to be conducted along the lines employed by this Department in the South.

C. W. Howard, of the Rockefeller Institute, has been appointed instructor in entomology, and O. G. Babcock, of the Maryland College, assistant in entomology, in succession respectively to C. S. Spooner, who has accepted an appointment in the office of the state entomologist of Georgia, and H. B. Scammell, who has been appointed county inspector of nurseries and orchards in Colorado. F. H. Stoneburn, poultry husbandman at the Connecticut College and Station, is to have charge of the poultry section after August 1.

Mississippi Station.—A modern cattle barn 120 by 48 feet, and a concrete silo 36 feet high and 18 feet in diameter, have been completed at a cost of $4,000.

Montana Station.—G. E. Smith, assistant chemist at the Ontario Agricultural College, has been appointed assistant chemist, commencing April 1.

New Hampshire College.—It is planned to utilize the state appropriations of $5,000 for extension work largely for the following purposes: Correspondence, demonstrations, advice as to farm, orchard, and forest management, farm and orchard surveys, the formation of dairy test associations, cooperative tests with county farms in variety testing of corn, cooperative tests with farmers in handling hay lands and using agricultural lime, a census of the sheep industry, exhibits at fairs, services for agricultural lectures and as judges, identification of fruits, weeds, insects, and plant diseases, with recommendations, county institute excursions to the college in the summer, two-day farmers' institutes at the college during the winter, and the preparation of agricultural reading courses.

Frank App, assistant in agronomy at the Pennsylvania Station, has been appointed assistant professor of agronomy in the college and assistant agronomist in the station.

New Mexico College and Station.—The college held its first Farmers' Week January 1 to 6, offering lectures and demonstrations in horticulture, agronomy, soils, animal husbandry, dairying, irrigation, entomology, and domestic science. There was an attendance of about one hundred, and many favorable comments were elicited from the press of the State.

A demonstration train was sent out over the entire Santa Fe line in New Mexico during 17 days of January. The train consisted of six cars, two of which were fitted up for live stock, one (a flat car) for showing root systems in fruit trees, one for agricultural exhibits, one for a lecture coach, and one for the use of the staff. The trip included 17 of the 26 counties, and a total of 32,244 people visited the train. A special feature dwelt upon was the organization of boys' and girls' industrial clubs.

Cornell University and Station.—Filibert Roth, at one time assistant professor of forestry in the university and since 1903 head of the forest school of the University of Michigan, has been appointed professor of forestry in the college of agriculture. He will assume charge of the department of forestry in the fall of 1912.

Some very striking results have been obtained from the new races of timothy produced at the station. The average yield in 1911 of 17 new varieties was 7,153 lbs. per acre as compared with 4,091 lbs. from seven check plats of ordinary timothy. The half dozen best varieties gave an average increase of 4,040 lbs. per acre. In 1910, the first crop season for these plants, the average increase for the new sorts was only 851 lbs. per acre.

New York State Station.—G. Talbot French, assistant botanist, has resigned to accept a position with the Virginia State Department of Agriculture in charge of seed inspection work, this taking effect February 1.

Ohio State University and Station.—F. S. Jacoby has been appointed instructor in poultry husbandry and will be in charge of the newly established poultry department. Three buildings are to be erected—a general poultry house, a brooder house, and a structure for student class work and judging.

At the request of the Board of Administration which, under a law enacted a year ago, now has control of the eleemosynary, reformatory, and penal institutions of the State, the station has undertaken the general management of a tract of nearly 1,700 acres lying about 15 miles southwest of Columbus, and held jointly by the Institution for the Feeble Minded and the penitentiary. The station will operate this as a demonstration farm, and has appointed John W. Klinefelter as superintendent. Other appointments recently made for extension work include A. L. Higgins and Charles N. Mooney, of the Bureau of Soils of this Department, and Cary W. Montgomery as assistants in the department of cooperation, and Victor Herron as assistant in the department of horticulture. E. R. Allen, assistant in chemistry at Cornell University, has been appointed soil bacteriologist, vice Thomas F. Manns, whose resignation has been previously noted.

Oklahoma Station.—John C. Reese, a 1911 graduate of the Maryland College, has been appointed assistant chemist.

Oregon College and Station.—A stock farm of 115 acres, just south of Corvallis, has been purchased for use as a college stock farm and will be utilized for all stock-feeding experiments and the college work in animal husbandry except dairying. A prune survey covering 11 counties has been completed. Spraying apparatus to the value of about $2,000 has recently been given the college for the equipment of the new spraying laboratory.

B. W. Hollis has been appointed instructor in veterinary science and has entered upon his duties.

South Carolina Station.—A tract of 200 acres of land a quarter of a mile from the city of Florence has recently been purchased at a cost of $40,000, for use as a substation. The land is considered especially well adapted to experimental purposes, and the farm is expected to afford opportunities for greatly enlarging the work of the station.

Tennessee University and Station.—W. H. McIntire, assistant experimental agronomist of the Pennsylvania College and Station, has been appointed associate chemist and entered upon his duties February 15.

Texas College.—D. T. Griswold, instructor in animal husbandry, has accepted a position as instructor in agriculture in the college of agriculture of the University of Porto Rico.

Virginia College.—Dr. J. M. McBryde, a former president of the institution, was awarded the McMaster medal by the University of South Carolina at the

Founders' Day celebration, January 12. This medal is awarded annually by the university to an alumnus or former student for "distinguished service to mankind."

Washington College and Station.—H. P. Barss has resigned as instructor in botany and assistant plant pathologist to accept a position as assistant professor of plant pathology in the Oregon College and Station.

West Virginia Station.—Hubert Hill, assistant feed chemist of the North Carolina State Station, has been appointed assistant chemist, and has entered upon his duties.

Macdonald College.—Recent appointments include W. P. Fraser as lecturer in biology, vice J. M. Swaine, resigned to become assistant entomologist of the Dominion Experimental Farms, in charge of the work on forest insects; W. J. Reid as assistant in animal husbandry, vice W. B. Cooley, resigned to engage in commercial work; Peter I. Bryce, assistant in biology, vice W. H. Brittain, appointed assistant botanist of the seed division of the Dominion Department of Agriculture; and M. A. Jull, formerly live stock commissioner of British Columbia, as lecturer in poultry and poultry management. F. C. Elford has resigned as poultry instructor and manager to engage in commercial work.

New Ampelographical Station in Spain.—According to *La Información Agrícola*, an ampelographical station was established in Madrid by a royal decree of November 17, 1911. The station, which is to be located on the grounds of the Agricultural Institute of Alfonso XII, will be charged with the organization of a traveling inspection service for assistance in the fight against phylloxera and in the reconstitution of vineyards, a general study of the viticultural conditions in each district, the establishment of experimental fields and nurseries, the classification of Spanish varieties of grapes and testing the adaptation of the same to various American stocks, hybridization experiments, the formation of a museum of Spanish viticulture, and other matters pertaining to grape pruning and spraying. It will cooperate with all of the provincial ampelographical and enological centers.

Nicholás García de los Salmones, the well-known Spanish agronomic engineer, has been selected as director. He will be assisted by a body of specialists.

American Society of Agricultural Engineers.—The fifth annual meeting of this society was held at St. Paul, Minn., December 27 to 29. Among the papers were the following: Larger Farm Implements and the Cost of Crop Production, by F. H. Demaree; Corn Planter Tests, Value and Method, by C. O. Reed; Some Agricultural Engineering Problems in Mexico, by S. F. Morse; The Agricultural Engineer in the West, by C. R. Sessions; Farm Buildings—Location as a Factor Affecting Farm Labor Efficiency, by L. W. Chase; Barn Framing, by F. L. Marsh; Lighting Farm Buildings, by H. H. Musselman; Low Gravity Fuels for Internal Combustion Tractors, by J. A. King; and The Tractor for Intertilled Crops and the Need of Tractor Implements, by Fred Glover.

Officers were elected as follows: President, H. W. Riley, Ithaca, N. Y.; vice presidents, J. B. Bartholomew, Peoria, Ill., and L. W. Chase, Lincoln, Nebr.; secretary, C. O. Reed, Urbana, Ill.; and treasurer, J. L. Mowry, St. Paul, Minn.

Second International Congress of Entomology.—The second congress of this organization will be held at Oxford, August 5 to 10, under the presidency of Prof. E. B. Poulton. Communications should be addressed to the general secretary of the executive committee, Dr. Malcolm Burr, care Entomological Society of London, 11 Chandos Street, Cavendish Square, London, W.

New Journals.—The first number of *Internationale Mitteilungen für Bodenkunde*, edited by Wahnschaffe, Margoci, and Ramann with the cooperation of a large number of collaborators in different countries (E. W. Hilgard representing the United States), has recently appeared. This journal, of which

there are to be six numbers annually, was established in response to a widespread demand which was voiced in a resolution adopted by the International Agrogeological Congress in Stockholm in 1910. It is the first journal to be exclusively devoted to the subject of soils. Its announced purpose is to advance the scientific and practical knowledge of soils in the widest sense. Each number is to contain original articles, scientific news notes, abstracts, and announcements of new publications.

It is to be hoped that the journal will be made truly international in character and will gather in its pages the best results of soil investigations throughout the world, the reports of which are now widely scattered and in many cases practically inaccessible.

The Journal of Genetics has been established under the editorship of W. Bateson, director of the John Innes Horticultural Institution, and R. C. Punnett, professor of biology in the University of Cambridge. It is stated that the periodical will be devoted mainly to the publication of records of original research in heredity, variation, and allied subjects, and to articles summarizing from time to time the existing state of knowledge in the various branches of genetics.

It will be issued in parts as material accumulates and four such parts appearing annually, so far as possible, will constitute a volume. The initial number contains the following articles: White-flowered Varieties of *Primula sinensis*, by Frederick Keeble and Miss C. Pellew; The Inheritance of Color and Other Characters in the Potato, by Redcliffe N. Salaman and Miss Pellew; Studies in the Inheritance of Doubleness in Flowers—I, Petunias, by E. R. Saunders; and The Effects of One-Sided Ovariotomy on the Sex of the Offspring, by L. Doncaster and F. H. A. Marshall.

The Agricultural Journal of Egypt is being issued from time to time by the Director-General of the Department of Agriculture. The initial number contains the following articles: The Department of Agriculture and an Indication of Some of the Agricultural Problems in Egypt, by G. C. Dudgeon; Report on the Manurial Trials on Cotton Carried Out on the State Domains, 1910, by Frank Hughes and H. C. Jeffereys; The Soy Bean, by G. C. Dudgeon; Distribution of Cotton Seed on Credit to the Smaller Cultivators, by A. T. McKillop; Cotton Cultivation in Upper Egypt, by I. E. Fahmy; Methods Employed in Egypt and Elsewhere to Check the Ravages of the Cotton Boll Worm, by G. C. Dudgeon; and note on Rice Cultivation in the Delta, by R. W. Brigstocke.

Revista de Medicina Veterinaria de la Escuela de Montevideo is being issued as the monthly organ of the veterinary school at Montevideo. An account of the school and its organization and curriculum, together with plans and illustrations of its large and attractive buildings and equipment, appears in the initial number, together with an article on piroplasmosis by the director of the school, Dr. D. E. Salmon, formerly chief of the Bureau of Animal Industry of this Department, articles on meat inspection, reports of the hospital clinics of the school, reviews of current literature, and notes.

Zentralblatt für allgemeine und experimentelle Biologie is a semimonthly abstract journal of general and experimental biology. It is under the editorship of Dr. Heinrich Poll, of Berlin.

Boletín de la Dirección General de Agricultura is being published by the secretary of public works of Mexico. It is issued in three parts, the first being devoted to agriculture and zootechny, the second to rural economics and sociology, and the third to forestry, replacing the *Revista Forestal* formerly published by the forestry division, which has been recently merged with the department of agriculture. Contributions are to be received from the members of the

department staff but also from others interested in the development of Mexican agriculture and forestry.

Memorias do Instituto Oswaldo Cruz is being published at Rio Janeiro by the staff of the Oswaldo Cruz Institute. It will appear at irregular intervals, at least one volume of 200 pages being issued annually. The initial number is devoted largely to studies in immunity, protozoology, and entomology, including Studies on Tuberculosis, by A. Fontes, and notes on the Biology and Systematics of Brazilian Anopheles and Their Significance in Malaria, by Arthur Neiva.

Bulletin Agricole du Congo Belge is a quarterly published in Brussels by the director general of agriculture under the Belgian minister for the colonies, serving both as a vehicle for official communications and for the dissemination of the results of experimental work in the colony and elsewhere, and of other data of interest. The initial number describes the organization of the agricultural service in the Belgian Congo and reports various lines of work under way.

Landwirtschaftliches Jahrbuch für Bayern will be issued in from eighteen to twenty-four numbers annually by the Bavarian Agricultural Union, with Friedrich Edler von Braun as editor. The initial number summarizes the one hundred years' history of the union and also contains an article on the Fusarium Disease of Winter Rye, by L. Hiltner et al.

Agros is being published monthly as the official organ of the agronomy section of the Federation of Students of Uruguay. One of the recent numbers contains articles on photography as applied to scientific agronomy by J. Schroeder, an outline of the course offered in the National Institution of Agronomy at Montevideo in animal feeding, by H. Van de Venne, and several shorter articles.

The Royal Botanical Society of London has established *The Botanical Journal* as its official organ. The initial number contains an article outlining the work of the society, a summary of meteorological observations during 1909 at its botanical gardens, a paper on The Flora of Victoria, by A. J. Ewart, and numerous short articles and notes.

Revista de Veterinaria e Zootechnia is a quarterly, published as the official organ of the veterinary service of the Ministry of Agriculture, Industry, and Commerce of Brazil. It contains both administrative notices and original articles in veterinary science.

The Horticultural Society of Argentina is issuing *Revista Horticola* as its monthly organ. The initial number includes articles on mushrooms, strawberries, spraying apparatus, and *Bacillus radicicola*.

Boletin de Fomento is being published monthly as the official organ of the ministry of public works of Costa Rica. In addition to official announcements, decrees, etc., several original articles pertaining to tropical agriculture by members of the staff are included.

The *International Milk Dealer* is being published monthly in the interests of milk dealers. The initial number contains an article by Dr. George M. Whitaker, formerly of the Dairy Division of this Department, on Milk Dealers and the Law.

Der Pilzfreund is a new popular monthly devoted to mushrooms and mushroom growing with special reference to conditions in Germany, Austria, and Switzerland.

ADDITIONAL COPIES of this publication may be procured from the SUPERINTENDENT OF DOCUMENTS, Government Printing Office, Washington, D. C., at 15 cents per copy.
Subscription price - - - - $1 per volume.

EXPERIMENT STATION RECORD.

VOL. XXVI. APRIL, 1912. No. 5.

One of the classes of publications provided for when the experiment stations were established was the annual report. This was designed to supply a record of progress from year to year, giving the operations of the station and the use made of its funds as a public institution. Made to the governor of the State, the report was to be a public document for the benefit of both state and federal officers, and for the information of the experiment stations in other States. In practice it was usually given a wider circulation.

While originally an important publication in most States, more permanent in character than the bulletins, of late it has come to occupy a quite insignificant place at many of the stations, and in the case of a considerable number is gradually dropping out of sight entirely. A hasty examination discloses the extent to which this tendency has already gone. Two stations have published no reports since 1902, one none since 1903, and another since 1904. The last date for several institutions is 1906, and for a larger number it is 1908. Some of the stations have signified their intention of making up the missing numbers, and others, after skipping three or four years, now state that the annual report has been discontinued.

The uncertainty of the policy in this respect has been a great inconvenience to many libraries which attempt to preserve complete files of the station publications. Especially is this the case where the bulletins and reports are bound by years or other stated periods. The loose numbers must be kept indefinitely, entailing risk of loss, and the reports must be written for periodically in the effort to complete the volumes.

The fact that an annual report was one of the requirements under the Hatch Act has apparently been lost sight of or ignored. At a number of stations it has always been treated in a rather perfunctory manner, which only partially met the expectations of a "full and detailed report" of the station's operations and finances, and this practice has been on the increase. In the form which was becoming increasingly common, it could not be said to be of much interest or permanent value as a record, and was hardly missed except by bibliographers and librarians when it was discontinued.

As a reason for the discontinuance of the annual report the excuse may be advanced that the stations are heavily burdened with work,

and are called upon for so wide a range of service that they are under great pressure for time. This is one of the results of the rapid turning of the tide in the direction of the stations, the position they now occupy in the development of agricultural affairs in their States, and the difficulty in getting experienced men for their work. But this difficulty is a quite common one, and can hardly be said to be peculiar to stations which have failed to provide a record of progress.

It would seem that the desirability of such a report, apart from the federal requirements, would appeal to the States as a matter of efficient administration; and this was evidently the supposition on which the provision was written into the Hatch Act. The report was to be a state document, and the governor was empowered, through the state's acceptance of the provisions of the Hatch Act, to require such a report. The method of its publication, which frequently involves considerable delay in issuing the report for a given year, has resulted in leaving it with the States to see that ultimately the obligation was met. But apparently many of the States have paid little attention to the matter. This is the more surprising as the station is a state institution, now receiving large amounts of money. The people are entitled to an accounting of some sort other than that which the bulletins supply, and the wisdom of failing to provide any continuous record of so important an institution seems very questionable from every standpoint.

Twenty-five years ago this spring a national system of experiment stations was provided for by Congress. The beginnings of these institutions and their development are already matters of considerable historic interest. But where the annual report is lacking or is so brief as to furnish little information, there are no systematic records available for tracing the history and evolution of many of these stations and their public support. The stations as a system are growing in importance year by year, the character and scope of their activities are undergoing steady change, new departments are being formed, their work differentiated, new buildings and other facilities provided, new appropriations placed at their disposal, and important changes made in personnel and management. The record of these activities and developments has a distinct historical as well as current interest. How otherwise is the history of an institution to be traced, or the occurrence of important events to be fixed?

There is clearly a place for such a document, and a need which warrants the expense and effort of its preparation. While the station publications have increased in number and in kind, and have been differentiated to meet the needs of different classes of readers, nothing has been provided to take the place of such a review. As a leading public institution each station is entitled to a public record, a means of recording for its own benefit, as well as for the State and the student, the service it is rendering to the public welfare. It

would seem that a responsibility rests upon its officials to provide such a record. It is an opportunity as well as a duty. It is for protection as well as for general understanding.

The character of the annual report will naturally depend upon circumstances, governed frequently by requirements within the State. While it may not be made the detailed record of the station's experiments and conclusions, it may well deal with its main lines of effort, and the important departures and events of the year, to a greater extent than is the case with the purely perfunctory report. Unless it does this much it can hardly be said to meet expectations. Several stations have recently modified their reports so as to strike a happy medium between the two extremes. Such an account may be made readable and instructive, and enables the busy man to gain an intelligent and quite comprehensive view of the station and its work.

When the State agricultural experiment stations were founded under the Hatch Act, it was difficult in certain lines of work to secure competent men, and this was especially so in regard to economic entomology. There were very few well trained economic entomologists then in the country, and for the most part stations taking up entomological work were obliged to appoint either untrained men or to take men who had established some reputation for themselves as entomologists without having engaged in directly practical work, while in other cases the entomological work was handled by the agriculturist or the horticulturist of the station.

New Jersey appointed as her first entomologist, Rev. Dr. George D. Hulst, a man who had made his entomological reputation by working upon a family of moths. He served for only a year, and in 1889, Dr. John Bernhardt Smith took his place and remained connected with the station from that time until March 13, last, when he died at his home in New Brunswick.

Dr. Smith was one of the most prolific writers on economic entomology which this country has seen, and his work was sound. During the twenty-two years of his active work in economic entomology, he built up a reputation for himself and for his State second to that of no individual or institution. During the first year of his appointment, he issued four special bulletins of much value, and from that time on he handled in a masterly way every entomological emergency that made its appearance.

Dr. Smith was born on November 21, 1858, in New York City, of German parentage, and was educated in the public schools. He was admitted to the bar in 1880, and practiced law in Brooklyn between 1880 and 1884. He was greatly interested in insects, joined the Brooklyn Entomological Society of that time, and became editor of the bulletin of that society. This publication he afterwards developed into a periodical known as "*Entomologica Americana*," which

became an important vehicle for the publication of smaller papers and notes. In 1884, he was made special agent of the Division of Entomology, U. S. Department of Agriculture, and for two years did field work, especially upon insects affecting the hop and cranberry. This was his first introduction to economic entomology. In 1886, he was made aid in the Division of Insects of the U. S. National Museum, and held this position until he was appointed to his final position in New Jersey. During the four years he was connected with the National Museum, it is true that his work was all of a systematic character and that he did no actual work in economic entomology, but he was a member of the Entomological Society of Washington and was constantly associated with the men of the Division of Entomology, U. S. Department of Agriculture, and followed their work intimately and discussed it with them; so that he really lived in an atmosphere of practical work.

With the founding of the Association of Economic Entomologists, an organization which has made a great impress on practical entomology, not only in this country but in other parts of the world, Dr. Smith was made the secretary of the association and held this office for two years. He was made second vice-president in 1893, first vice-president in 1894, and president in 1895. His address as retiring president was entitled, "Entomological Notes and Problems," and was delivered August 27, 1895, at Springfield, Mass. It was a thoroughly practical address, dealing with all the phases of the work which the then new body of officials were engaged upon.

Dr. Smith's bibliography covers hundreds of titles. His industry was enormous. He not only made his office a noted one for its practical work, but he maintained all through his career an active interest in every phase of entomological research. He published, for example, two great catalogues of the insects in New Jersey and very many systematic papers upon that Lepidopterous Family, Noctuidæ.

His latest work, and that which perhaps brought him the most fame, was that with the New Jersey mosquitoes. He was the first entomologist who realized and who proved that the banded-legged mosquitoes of the Atlantic coast must differ widely in habit and mode of life from the rainwater-barrel mosquitoes and the woodland mosquitoes of the interior; and he found that these salt-marsh mosquitoes breed in the salt marshes and that their eggs are not laid in the water but on the mud and that they fly a distance of from 30 to 40 miles. These claims seemed revolutionary to earlier students of mosquitoes, but he proved his case beyond doubt and succeeded finally in securing a large appropriation from his State, and in demonstrating that it is possible at a comparatively slight expense to control even these wild, salt-marsh forms.

Dr. Smith's death is a great loss to the State of New Jersey and to American economic entomology.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Annual report on the progress of chemistry for 1910, edited by J. C. CAIN and A. J. GREENAWAY (*Ann. Rpts. Prog. Chem. [London], 7 (1910), pp. IX+303*).—The contents of this report continuing previous work (E. S. R., 23, p. 210) are as follows: General and Physical Chemistry, by T. M. Lowry; Inorganic Chemistry, by H. B. Baker; Organic Chemistry, by C. H. Desch and A. Lapworth; Analytical Chemistry, by A. R. Ling; Physiological Chemistry, by W. D. Halliburton; Agricultural Chemistry and Vegetable Physiology, by A. D. Hall; Mineralogical Chemistry, by A. Hutchinson; and Radioactivity, by F. Soddy.

Yearly report in regard to the progress made in the chemistry of foods and condiments, H. KUTTENKEULAR (*Chem. Ztg., 35 (1911), Nos. 36, pp. 322, 323; 38, pp. 338, 339*).—A detailed report in regard to the more important work in this direction.

The chemistry of lime-sulphur wash, W. B. BURGESS (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 61–69*).—The proportion of lime to sulphur, according to the author, should not exceed 1:2, and in general 100 lbs. of lime to 150 lbs. of sulphur, or 100 lbs. of lime to 200 lbs. of sulphur should be taken. Lime-sulphur wash when exposed to the air was found to deposit as much as three-fourths of the total sulphur present as free sulphur, the amount deposited, however, depending upon the time of exposure.

"Lime-sulphur wash as a summer fungicide acts in 2 distinct ways: (1) As a contact spray, the polysulphids in the wash acting in a way similar to liver of sulphur; (2) as a protective coating to the leaves, due to the thin layer of sulphur in a fine state of division deposited from the thiosulphates and polysulphids by decomposition. This sulphur would be much more efficient than flowers of sulphur for 2 reasons: (a) The former adheres very closely to leaves, in fact, can not be removed by the most drastic washing; thus a very great drawback in the use of flowers of sulphur is overcome; (b) owing to its fine state of division, the deposited sulphur would oxidize more quickly than flowers of sulphur, and thus prove a more powerful fungicide, as its action probably depends on the formation of sulphur dioxid. It is probable that the chief value of lime-sulphur wash lies in its use as a means of applying free sulphur to leaves.

"As to the question of injury, the polysulphids are the most likely to damage the sprayed plant, as liver of sulphur where used too strong is known to cause severe leaf scorching. However, these compounds have been shown above to be very rapidly decomposed, so their injurious action would not be very prolonged.

"Some preliminary trials with sodium thiosulphate on hop leaves showed that even with 20 per cent solutions only insignificant injury was done just at the tip of the leaves, [which] points to the fact that little injury is likely to come from this source."

The phosphoric acids, A. HOLT and J. E. MYERS (*Jour. Chem. Soc. [London]*, *99 (1911)*, *No. 581, pp. 384–391*).—"The following conclusions may be drawn from the experiments described in this paper: Pyrophosphoric acid is formed as an intermediate compound during the hydration of metaphosphoric acid. The rate of hydration does not accord with any simple order of reaction. Meta and pyrophosphoric acids, when prepared by dehydrating the ortho variety, give complex molecules in solution, but when prepared by decomposing the corresponding lead salts, simpler molecules result."

Colorimetric determination of phosphoric acid, J. POUGET and D. CHOUCHAK (*Bul. Soc. Chim. France, 4. ser., 9 (1911)*, *No. 13, pp. 649, 650; abs. in Jour. Soc. Chem. Indus., 30 (1911)*, *No. 15, p. 985*).—In regard to this method, which has already been noted (E. S. R., 21, p. 105), the authors point out that the acid sodium molybdate of commerce should be employed, and not the normal salt. In order to obtain the right composition of the reagent they recommend the following method for preparing it:

"Two solutions, A and B, are prepared, A by dissolving 95 gm. of molybdic acid and 30 gm. of dry sodium carbonate in 500 to 600 cc. of hot water, cooling, adding 200 cc. of pure nitric acid of 36 per cent, filtering and making up to 1 liter, and B by dissolving 2 gm. of neutral sulphate of strychnin in 90 cc. of hot water, cooling and diluting to 100 cc. One cc. of B is mixed with 10 cc. of A shortly before use, and the mixture filtered. To obtain a maximum of accuracy with the method, 2 tests should be carried out with 0.2 and 0.3 mg. of phosphoric acid respectively, to serve as standards, the one most resembling in tint the actual experimental solution being used for the colorimetric comparison." Standard solutions of phosphoric acid are prepared from monopotassium phosphate.

Determination of phosphoric acid by Neumann's method, I. BANG (*Biochem. Ztschr., 32 (1911)*, *No. 5–6, pp. 443, 444*).—The method was modified as follows:

Precipitate the phosphoric acid in the usual manner with ammonium molybdate, wash the precipitate, and then treat it with water and a definite quantity of semi-normal potassium hydrate solution until it is dissolved. Fifty cc. of formaldehyde solution, to which has been previously added from 5 to 6 drops of phenolphthalein and titrated until a slight red tint is produced, is then added. The solution is then titrated with half-normal sulphuric or hydrochloric acid until the solution is colorless, and then with alkali to a distinct red coloration.

The titration of alkali carbonates beside hydroxids or bicarbonates, J. TILLMANS and O. HEUBLEIN (*Ztschr. Angew. Chem. 24 (1911)*, *No. 19, pp. 874–876*).—Alkali carbonates can be accurately titrated with acid in a solution containing hydroxids or bicarbonates, using phenolphthalein and methyl orange as the indicators. The titration against phenolphthalein, however, must be in a closed flask in order to prevent the escape of carbon dioxid. An exact determination of alkali carbonates in such solutions can also be made by determining the methyl orange alkalinity, and the amount of acid thus employed is used as a basis for a second test with a new portion of the solution. The carbon dioxid liberated in the latter test is titrated with sodium hydroxid against phenolphthalein in a closed flask. The end reaction in the latter method can be more easily noted.

An improvement in the method for estimating humus in soils, J. B. RATHER (*Jour. Indus. and Engin. Chem., 3 (1911)*, *No. 9, pp. 660–662*).—Previously noted from another source (E. S. R., 25, p. 614).

The determination of the amount of dissolved oxygen absorbed by sewage effluents containing nitrites, and of the amount of nitrite in sewage effluents

and water, R. W. CLARKE (*Analyst, 36 (1911), No. 425, pp. 393–396*).—The Winkler method in the presence of nitrites and the Rideal and Stewart method when used for the sewage before dilution are entirely unsatisfactory. If the acid is neutralized in the latter method with magnesium carbonate, it can be applied to the estimation of both dissolved oxygen and nitrites, but only when some modifications are introduced.

In regard to the temperature coefficients of the decomposition of invertase, H. EULER and S. KULLBERG (*Hoppe-Seyler's Ztschr. Physiol. Chem., 71 (1911), No. 2, pp. 134–142; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 23, pp. 943, 944*).—Continuing previous work (E. S. R., 26, p. 309), which was conducted with an extract of dried yeast, the authors report the results with a purer invertase preparation prepared from a juice obtained by autolysis.

The results show a close agreement with those obtained previously, and furthermore demonstrated that the proteins, peptones, carbohydrates, etc., which are present in dried yeast, have no or little influence upon the resistance of invertase against a certain degree of heat, i. e., 63±0.2° C.

It is furthermore noted that the temperature coefficient a, the constant of stability $\left(k_E=\frac{l}{t}ln\frac{ko}{k_i}\right)$, and particularly the thermal death point, which in a period of 30 minutes reduces the enzymatic activity (measured by the reaction constant k) to one-half of a definite hydrogen ion concentration (10^{-6}), are values which can be accurately determined. The optimum temperature for invertase obtained from top fermentation yeast lies 25° C. above that obtained from bottom yeast. The stability of the enzyms in top yeast is also greater.

Researches concerning the composition of the wood and bark of a pear tree, A. MANARESI and M. TONEGUTTI (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 714–717; abs. in Chem. Zentbl., 1911, I, No. 5, p. 333; Chem. Abs., 5 (1911), No. 16, p. 2663*).—A branch from a 1-year-old pear tree having the leaves and buds removed was examined, with the following results: The ratio of bark to wood was 27.9 : 72.1. The substances determined were crude fiber, starch, pentosans, nitrogen, ash, and ash constituents. Bark was found to contain 3 times as much ash as the wood, was lower in phosphorus and iron, and richer in silica and calcium.

The chemical composition of the woods from different branches of fruit trees, A. MANARESI and M. TONEGUTTI (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 758–773; abs. in Chem. Zentbl., 1911, I, No. 5, p. 333; Chem. Abs., 5 (1911), No. 16, p. 2663*).—Various types of branches were analyzed, some old and some young. Pear, apple, plum, and cherry twigs were used. The chemical composition of the wood and ash was determined, and many tables of analyses reported.

The fruit-bearing wood was found much richer in nutrients than the foliage-bearing wood.

Short morphological and chemical studies of the foliage of different branches of fruit trees, A. MANARESI and M. TONEGUTTI (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 787–794; abs. in Chem. Zentbl., 1911, I, No. 5, pp. 333, 334; Chem. Abs., 5 (1911), No. 16, p. 2663*).—The leaves of branches from pear, apple, plum, and peach trees bearing fruit and from others not bearing fruit were examined as regards the comparative dimensions of the leaves and length of stem.

The leaves on the fruit-bearing branches were on the average longer stemmed, longer, narrower, thinner, and richer in nutrients than the nonbearing branches.

The chromogenic substances of white grapes, S. DEZANI (*Staz. Sper. Agr. Ital., 43 (1910), No. 5, pp. 428–438; abs. in Jour. Chem. Soc. [London], 100*

(*1911*), *No. 581, II, p. 223*).—In white grapes 2 chromogenic substances are present, one of which is precipitated with lead acetate. With hydrochloric acid coloring matters can be obtained which are similar to œnocyanins. The conversion of these substances into coloring matters, according to the author, is not an oxidation process but is due to hydrolytic scission with the formation of a reducing body. The residue obtained from the chromogenic substances contains bodies which give a red coloration with alkali.

Progress in the examination and judgment of foodstuffs and condiments during the years 1909 and 1910, UTZ (*Österr. Chem. Ztg., 14 (1911), Nos. 12, pp. 149–153; 13, pp. 165–167; 14, pp. 177, 178; 15, pp. 188–194*).—This is a retrospect of the more important advances made in this regard.

The optical behavior of lactic acid in a meat preparation, E. SALKOWSKI (*Hoppe-Seyler's Ztschr. Physiol. Chem., 69 (1910), No. 6, pp. 471–473; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 579, I, p. 6*).—While examining the lactic acid contained in an American beef extract it was noted that after a time the lactic acid passed over into the optically inactive form. The transformation was completed in one year. This change may be due to the presence in the extract of a large quantity of potassium dihydrogen phosphate.

The quantitative microscopic detection of ustilaginous spores (Tilletia caries, etc.) in flour, bran, and cereals, G. BREDEMANN (*Landw. Vers. Stat., 75 (1911), No. 1–2, pp. 135–157*).—The existing methods for determining ustilaginous spores in cereals are only applicable to whole grain and not to ground or mill by-products. The author proposes the following method for this purpose:

From 3 to 5 gm. of material is finely powdered so as to pass through a sieve having meshes 0.3 sq. mm., and dried in a water oven. A small portion of the powder is then placed upon a glass slide and mixed with a few drops of hydrochloric acid-chloral hydrate-glycerin mixture (10 parts of chloral hydrate, 5 parts of water, 5 parts of glycerin, and 3 parts of 25 per cent hydrochloric acid, specific gravity 1.124), and heated to the boiling point on the slide.

If the amount of spores in the cereal is not abnormal about 5 spores per field (magnification 150 diameters) will be present. The mixture in this case will serve directly for the quantitative determination. If, however, more spores than this are present 1 part of the mixture is diluted with 9 parts of rice starch in a porcelain mortar. Of this mixture from 5 to 8 mg. are carefully weighed off on a slide, mixed with from 3 to 4 drops of the hydrochloric acid-chloral hydrate-glycerin mixture delivered from a capillary pipette, gently warmed over a micro burner until a paste is formed, allowed to cool, and covered with a 20 mm. cover glass without using pressure. The spores contained in the entire preparation are counted (magnification 165) with the aid of a searching table, and the results calculated to 10 mg. of sample. The figures thus obtained are divided by what is considered the normal amount of spores present in a good sample of cereal, viz, 450,000.

Tests with the method are given.

The colorimetric determination of copper in canned goods, H. SERGER (*Chem. Ztg., 35 (1911), No. 102, p. 935*).—Although the author obtained very satisfactory results with the Lakus electrolytic method (E. S. R., 26, p. 208) with conserves colored by copper sulphate, he was not entirely satisfied, because of the time required for the execution of the process, and, furthermore, the fact that when minimal amounts of copper were present the method left much to be desired. Attempts were therefore made to use a colorimetric method where small amounts of copper were in question. The results with peas and spinach containing copper salts showed that the colorimetric method when properly applied will yield good results. The objection made to the pro-

cedure by Graff (E. S. R., 20, p. 1161), that the ammonia precipitated retains much copper, does not hold good.

The estimation of small quantities of lead in beer, A. W. KNAPP (*Jour. Soc. Chem. Indus., 30 (1911), No. 4, pp. 165, 166*).—For determining in beer the lead content which originates from the pipes through which the beer passes, the author uses the following method:

"One hundred cc. of beer are evaporated to about 20 cc. in a porcelain dish, which is as large as will conveniently go into a muffle. Ten cc. of nitric acid are carefully added and the evaporation continued until there are about 4 cc. of a viscous liquid. One gm. of magnesia is well mixed with the sirup and the whole dried and ignited in an open muffle till the ash is white. The ash is dissolved in 15 cc. of dilute nitric acid (roughly 3 times normal strength), neutralized with dilute ammonia solution, made acid with 10 cc. roughly normal acetic [acid] and diluted to 100 cc. The small amount of insoluble matter is allowed to settle, and 50 cc. of this solution in a Nessler glass is treated with 3 cc. saturated sulphuretted hydrogen water and compared with standards put on at the same time.

"To make the standard solution of lead, a strong solution containing 1.831 gm. of lead acetate and 6 cc. of glacial acetic acid per 100 cc. is first prepared. One cc. of this solution is diluted to 100 cc. to obtain the standard solution (1 cc.=0.0001 gm. of lead)."

Analyses of sugar beets, 1905 to 1910, together with methods of sugar determination, A. H. BRYAN (*U. S. Dept. Agr., Bur. Chem. Bul. 146, pp. 48, pls. 2, figs. 5*).—This bulletin deals with and describes the methods used for sampling from the field, pile, wagon, or car; laboratory sampling and pulping; sampling and testing seed beets; and the indirect and direct methods for determining sugar.

In connection with the indirect method for sugar, which is dependent upon pressing the juice from the beets and the determining of sugar in the juice, the author describes a hydraulic press which is used for obtaining the juice. Among the direct methods, in which the sugar is determined directly in the beet, are described the cold-water digestion methods of Pellet and Sachs le Docte, the hot-water digestion method, the hot-water digestion method of Sachs le Docte, Herzfeld's modification of the Sachs le Docte method (E. S. R., 25, p. 502), the alcohol, cold alcohol and hot alcohol digestion methods, and the alcohol extraction method.

In discussing the methods it is pointed out "that for very accurate or control work the alcohol extraction method should be used, but for general work, one of the hot-water digestion methods will give good results and the analyst is less likely to introduce errors in the manipulation. With the average sample of beets, the 2 methods when carefully applied will yield duplicate results, but in the case of very abnormal beets one method might give higher figures than another. The instantaneous methods (cold extraction) are only suitable with very fine pulp and the results can be depended upon only when they have been checked against a standard method. With these instantaneous methods as many samples of beets can be analyzed per day as by the indirect method, and it is claimed by many that the Sachs le Docte hot digestion method or the Herzfeld modification will yield as many determinations in a given time as the indirect method, with the same amount of work, provided the laboratory is fitted for the work."

In addition, detailed analytical data in regard to numerous sugar-beet analyses are given. These were obtained from beets grown in practically all sections of the United States. The data are finally condensed to show the

variability of the sugar content and purity by years, and for the purpose of providing a basis for comparing the various States as sugar producers.

An extended bibliography arranged in chronological order is appended.

The peroxydase of woman's milk, MARFAN and B. WEILL-HALLÉ (*Compt. Rend. Soc. Biol.* [*Paris*], *69 (1910), No. 32, pp. 396–398; abs. in Ann. Falsif., 4 (1911), No. 29, p. 160*).—Woman's milk, when treated with guaiacol, water, and hydrogen peroxid, may give 2 reactions, viz, a diffuse, brick-red color, and another one yielding a light orange-yellow tint.

The first test indicates the presence of colostrum. The second represents a normal sample of milk. The absence of the above reactions indicates either a milk of pathologic origin or one of bad quality.

Detection of watered milk by noting its electrical resistance, N. FAVILLI (*Riv. Sci. Latte, 1 (1911), No. 2, pp. 33–44, figs. 2*).—The electrical conductivity method is not deemed entirely adapted for detecting milk which has been adulterated with water, as it presents many possibilities for error.

The significance of the cryoscopic test for controlling the milk supply, L. PINS (*Die Bedeutung der Gefrierpunktserniedrigung der Milch für die Milchkontrolle. Inaug. Diss., Univ. Leipsic, 1910, pp. 54*).—This investigation was conducted with normal milk, colostrum, milk containing various substances such as sodium chlorid, cane sugar, sodium bicarbonate, and glycerin, milk from animals having udder disease, and milk diluted with water.

The depression of the freezing point of normal cow's milk was found to vary from 0.536 to 0.565, the extreme limits being from 0.529 to 0.569. The method of feeding, breed, age, and period of lactation had no influence upon this constant. According to the author, the method is to be given the preference over either the fat determination or the specific gravity determination methods.

Determination of fat in buttermilk, M. SIEGFELD and M. KERSTEN (*Molk. Ztg.* [*Hildesheim*], *24 (1910), No. 48, pp. 903, 904; abs. in Milchw. Zentbl., 6 (1910), No. 11, pp. 522, 523*).—During the past year various communications have appeared in regard to buttermilk which yielded on examination an abnormally low fat content. In this connection the authors made a comparative test between the Gerber acid butyrometric and the Röse-Gottlieb methods, which showed that the latter method yielded from 0.15 to 0.25 per cent more fat. This discrepancy in the result is said to be due to the fact that during butter making a portion of the fat becomes homogenized and does not separate out in the acid butyrometric test. If, however, the centrifuging process is continued a higher percentage of fat is obtained. A further influencing factor is that buttermilk, if examined according to the acid method, has a tendency to form plugs. The temperature is also a factor.

The detection of margarin in butter, A. ELOIRE (*Jour. Meat and Milk Hyg., 1 (1911), No. 8, pp. 449, 450*).—An instrument (the oleobutyrometer), constructed by Brullé for determining the density of butter fat for the purpose of detecting margarin in such samples, is described. With this instrument pure butter had a density of 865.5 gm. at 100° C., while butter with an addition of 10 per cent of margarin had a density of 864.95 gm.

Estimation of total fatty acids, P. SIMMICH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 1, pp. 38–44, figs. 2; abs. in Jour. Chem. Soc.* [*London*], *100 (1911), No. 581, II, p. 233*).—Incorrect results are obtained if the fatty acids are dried in the free state before weighing. To avoid this loss the author recommends estimating the total fatty acids which have been liberated in the usual manner from fats, soaps, and oils by separating them with ether or petroleum ether, neutralizing the ethereal extract with one-half-normal potassium hydroxid solution, and evaporating off the solvent in an atmosphere of hydrogen. The soap residue is finally dried at 100° C. in a partial vacuum

and weighed. The amount of fatty acids can then be elicited by subtracting from the weight obtained 0.01907 gm. for every cubic centimeter of one-half-normal potassium hydroxid solution used for neutralization.

Determination of acids in oils and fats, H. LOEBELL (*Seifensieder Ztg., 38 (1911), Nos. 19, pp. 501, 502; 20, pp. 530–532, fig. 1; Chem. Ztg., 35 (1911), No. 31, pp. 276, 277; abs. in Chem. Zentbl., 1911, I, No. 19, pp. 1452, 1453; II, No. 3, p. 163, fig. 1*).—In this method from 5 to 15 gm. of fat is melted, if necessary, and vigorously shaken with 25 cc. of alcohol. Fifty cc. of water and from 2 to 3 drops of a 1 per cent phenolphthalein solution are added and titrated with a decinormal sodium hydroxid solution until the color ceases to disappear. The flask is then vigorously shaken and titrated with decinormal hydrochloric acid until colorless.

Estimation of free fatty acids in fats, E. BÖDTKER (*Chem. Ztg., 35 (1911), No. 61, p. 548; abs. in Analyst, 36 (1911), No. 424, p. 355*).—A description of the method noted above, which is deemed of special value for colored fats as the dyestuffs are insoluble in water.

The determination of glycerin in fats and soaps, A. BEYTHIEN ET AL. (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 11, pp. 673–675*).—The Benedikt-Zsigmondy method, as modified by Allen,[1] is deemed an accurate and convenient method for determining glycerin. If, however, other substances are present in the fat or soap under examination which are oxidized to oxalic acid by an alkaline permanganate solution the acetin method must be employed.

A new method for detecting dioxydiamidoarsenobenzol (Salvarsan), J. ABELIN (*München. Med. Wchnschr., 58 (1911), No. 19, pp. 1002, 1003*).—The mthod is as follows: A small amount of Salvarsan is dissolved in from 2 to 3 cc. of water and from 3 to 4 drops of hydrochloric acid are added until the solution appears colorless. The solution is then cooled under running water and from 3 to 4 drops of a ½ per cent sodium nitrite solution are added, whereby a diazo body is produced which has a greenish, yellowish fluorescence. A 10 per cent solution of resorcin made alkaline with sodium carbonate is now added dropwise to the above solution, as a result of which a red coloration is produced.

The method can also be applied to detecting Salvarsan in the urinary secretion.

The determination of alkali in arsenical dip fluid, L. COHEN (*Jour. and Proc. Roy. Soc. N. S. Wales, 44 (1910), pt. 1, pp. 77–79*).—"The determination of alkali in dip fluid by direct titration against standard acid is complicated by the presence of tar and finely divided foreign matter from the hides of the cattle, which it is impossible to separate by filtration, and the black color of which precludes the use of an indicator, except in the form of test paper. If litmus paper is used, the carbon dioxid and perhaps also the arsenious acid indicate an acid reaction before all the sodium carbonate is neutralized; it consequently gives results a good deal too low."

The method proposed is as follows: "To 50 cc. dip fluid in a small beaker, run in 5 cc. normal sulphuric acid from a burette, stir, filter at once through dry paper, take 10 cc. filtrate with a pipette, transfer to a beaker, and dilute with about 100 cc. water. The solution is now colorless. Add 2 drops methyl orange solution (cochineal is entirely unsuitable, being rapidly bleached by the arsenic) and titrate to neutrality with decinormal NaOH. The end reaction will be found perfectly sharp. Calling n the number of cubic centimeters decinormal NaOH used, and p the number of grams Na_2CO_3 per 100 cc. of dip fluid: $p = .053 \times (10 - \frac{11}{10}\ n)$."

[1] Benedikt-Ulzer: Analyse der Fette, 1908, 5. ed., p. 197.

A sensitive test for the detection of phenol and salicylic acid, J. M. Wilkie (*Jour. Soc. Chem. Indus., 30 (1911), No. 7, pp. 402–404*).—The test is based on the formation of tri-iodo-phenol by adding iodin solution to solutions containing phenol, salicylic acid, etc.

Polarimetric determination of nicotin in tobacco juice and tobacco, J. De Grazia (*Fachl. Mitt. Osterr. Tabakregie, 10 (1910), No. 3, pp. 87–90, figs. 2; Jour. Soc. Chem. Indus., 30 (1911), No. 8, pp. 506, 507; abs. in Chem. Abs., 5 (1911), No. 15, p. 2507*).—The method is as follows: "Thirty gm. tobacco juice are mixed with 3.5 gm. CaO and 10 cc. H_2O, and distilled rapidly with a current of steam until about 180 gm. distillate have been collected. The rotatory power of this distillate is determined in a 200 mm. tube and the percentage of nicotin calculated from the formula $P=aGf/g$; G is weight of distillate, g that of tobacco juice, and f is a factor ('rotation constant') taken from the table given. For tobacco, 20 gm. of the finely powdered material are treated with 7 cc. KOH solution (1:1) a few grams NaCl, and 130 cc. boiling concentrated NaCl solution, and distilled first rapidly without steam until about 45 cc. have come over, and then with steam until the distillate amounts to 100 cc."

Factor f is used for the purpose of correcting the change of rotary power of the nicotin which is due to temperature.

The determination of nicotin in concentrated tobacco juices, J. Schröder (*Chem. Ztg., 35 (1911), No. 42, p. 382*).—Results are reported in this paper of 4 analyses made with various methods and in different localities of the same tobacco extract. Analyst No. 1, using the Schlössing method, obtained 6.41 per cent of nicotin; analyst No. 2, using the Kissling method, 6.23 per cent; and analysts Nos. 3 and 4, 9.4 and 8.8 per cent, respectively, their methods not being stated. The author announces an unpublished colorimetric method devised by Kissling and expresses the hope that it will soon be available to all making nicotin determinations in such extracts.

A polemical discussion in regard to the Ulex method (E. S. R., 25, p. 211) is also included.

Accurate estimation of nicotin in tobacco and in green plants of Nicotiana tabacum, R. Mellet (*Schweiz. Wchnschr. Chem. u. Pharm., 49 (1911), No. 9, pp. 117–120; abs. in Chem. Zentbl., 1911, I, No. 21, p. 1561; Analyst, 36 (1911), No. 424, p. 348*).—The Toth method, according to this author, is a good one for estimating nicotin in solution or in tobacco extracts, but requires some modification in order to apply it to solids. The following method is the one the author employs:

"Thirty gm. in the case of dry tobacco, and 250 gm. in the case of the green plant, are treated with boiling water in a well-closed flask, and after 24 hours the liquid is cooled and milk of lime added. The flask is again closed and allowed to stand for a further 24 hours with frequent agitation. The liberated nicotin is distilled off in a current of steam, in such a way that the volume of liquid in the flask is reduced. When the volume of distillate attains 2 to 3 times that of the original liquid the operation is stopped and the distillate is acidified with sulphuric acid. It is then evaporated to a small bulk with exclusion of air, and, after the addition of potassium hydroxid, the nicotin is extracted with ether. The ethereal solution, containing some ammonia, is concentrated until all the latter is eliminated. The remainder of the ether is evaporated at the ordinary temperature; the residue is dissolved in water and titrated with tenth-normal sulphuric acid. Estimations effected with known quantities of nicotin indicated that the total losses of the alkaloid amounted to 0.06 gm., which figure must be added to the values found."

Estimation of nicotin in tobacco extracts, W. Koenig (*Chem. Ztg., 35 (1911), No. 58, pp. 521, 522; abs. in Analyst, 36 (1911), No. 424, pp. 348, 349*).—

Satisfactory results were obtained with a modification of the Toth method, which is described. The results obtained with it agreed well with those yielded by the Kissling method (E. S. R., 25, p. 16), but the author considers it impossible to obtain correct results with the Ulex method (E. S. R., 25, p. 211).

Comparative investigations in regard to the examination of tobacco extracts, J. TOTH (*Chem. Ztg., 35 (1911), No. 101, pp. 926, 927*).—A comparative study of the Kissling, Ulex, De Grazia, Toth, and Koenig methods was made.

The results show that the Ulex method gives the highest results. The De Grazia method is very simple and very quickly executed, and can therefore be used for the examination of tobacco extracts in general. The only objection which can be raised against the method is that it is necessary to obtain more than 180 cc. of distillate in order to get accurate figures. For tobacco the results with the De Grazia method are unfavorable.

The toluol solution used in the Koenig method was found to be too dark for polarization, but when xylol was used the results obtained by polarization corresponded well with those obtained by titration. The titration results with the Koenig method agree very well with those obtained by the Kissling and Toth methods.

In regard to the determination of nicotin in tobacco extracts, W. KOENIG (*Chem. Ztg., 35 (1911), No. 114, pp. 1047, 1048*).—Commenting on Toth's criticism of the Koenig method, this author points out that he never experienced any difficulties in polarizing the toluol nicotin solution of tobacco extracts. He believes that Toth probably used a very weak light. In addition, when xylol was employed the specific rotation of nicotin must be considered 173 instead of 170, which it has in toluol.

Nicotin in wastes from tobacco plants, CHUARD and MELLET (*Abs. in Chem. Ztg., 35 (1911), No. 19, p. 177*).—The stalks, shoots, etc., of the tobacco plant contain considerable amounts of nicotin. The author proposes to make in the near future a study of the distillates and the variations therein from the different parts of the plant.

Wood turpentine: Its production, refining, properties, and uses, F. P. VEITCH and M. G. DONK (*U. S. Dept. Agr., Bur. Chem. Bul. 144, pp. 76, figs. 4*).—This bulletin discusses the feasibility of preparing wood turpentine (stump turpentine or wood spirits) from resinous woods, particularly from waste pine, fir, or spruce wood. This form of turpentine when properly distilled closely resembles gum turpentine.

The subject is considered under the headings of methods of production, including destructive distillation, steam distillation, extraction with solvents, refining wood turpentine and wood oils; equipment for the manufacture of wood turpentine; cost of producing wood turpentine; yields of various products from the distillation of resinous woods; properties and composition of wood turpentine; pine oils; principles of fractional distillation; use of the periodic column still; use of the pot still; commercial opinions as to the value of wood turpentine; and the value of wood turpentines as paint and varnish thinners.

Some experiments in refining wood turpentine show "that the percentage of oils in the distillate furnishes the most reliable and useful information as to the progress of distillation and the nature of the oils at different times, and this is also the simplest means of acquiring such information. Neither the specific gravity of the oils nor the temperature of the distilling vapors at the top of the still furnishes as reliable information, nor are they so conveniently determined. The temperature of the vapors is materially affected by the volume and temperature of the steam entering the still and by variations in atmospheric pressure. The former can of course be made practically constant

by the use of reducing valves, but corrections for atmospheric pressure require more training, experience, and care than can probably be given at such plants.

"The specific gravity of the samples taken during distillation often shows a decided conflict with the other data on the samples, but in the main it is a reliable indication of the progress of the distillation and the composition of the oil. But as this determination also requires more skill, and is in every way more difficult to make in the works, it is not as safe a guide as the volume relations of the distillate.

"The column still will give sharper separations of wood turpentine from pine oils than can be obtained with the pot still, but the experiments here described do not indicate any great superiority of the column. The data available, however, are inadequate to permit the drawing of definite conclusions as to the economy or efficiency of the two forms of stills."

About 5 barrels of refined wood turpentine, which had been obtained in the refining experiments, and of which approximately 75 per cent distilled below 170° C., were turned over to the painter of the Department and used by him on all classes of paint and varnish work from ordinary house painting to high-class furniture varnishing. No inferiority in the finished work or in behavior in applying was observed. Analyses of the turpentines and varnishes employed in the tests are included.

[Potato desiccation in Germany in 1910] (*Maschinen Ztg., 9 (1911), No. 2, pp. 20, 21; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 678, 679*).—In 1910, 454,416 metric quintals (about 50,000 tons) of potatoes were dried, and yielded 120.169 quintals of dried material, or 3.78 kg. of fresh potatoes to 1 kg. of dried potatoes. The yield varies greatly, however, according to the percentage of starch in the potatoes. Thus, in 1910, the maximum yield was represented by the ratio 3.17 : 1 between the weight of the potatoes and the weight of the flakes, and the minimum yield by 4.7 : 1.

The cost of drying 50 kg. of potatoes was on the average 62 pfennig (about 7 cts. per pound) in the works dealing only in this commodity and 54 pfennig in other establishments. "In order that this industry may be profitable as a business, the factory ought not to work less than from 150 to 200 days a year."

The extraction of olive oil, E. Mingioli (*Bul. Off. Gouvt. Gén. Algérie, 17 (1911), No. 3, pp. 37–40; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 2, pp. 384, 385*).—The results of tests with the Acapulco (Spanish) system for extracting olive oil are given. With the process a better cold extraction of the oil is possible, while with the hot method a higher yield is obtained than with the hydraulic press. The product obtained is less colored and more uniform. Other advantages are also described.

In regard to soy-bean oil, S. Keimatsu (*Chem. Ztg., 35 (1911), No. 91, pp. 839, 840*).—Soy-bean oil was found to contain 0.2 per cent of phytosterin (stigmasterin could not be noted); about 12 per cent of saturated acids, the greater portion of which was stearic and palmitic acids; and 80 per cent of nonsaturated fatty acids, of which 50 per cent is an isomeric linoleic acid, which yields an oxy acid having a melting point of 158 to 159° C., and 15 per cent consists of linoleic acid (oxy-sativic acid with a melting point of 173 to 175°) and oleic acid (oxy-dioxystearic acid with a melting point of 126 to 127°).

Soy-bean oil, C. Oettinger and F. Buchta (*Ztschr. Angew. Chem., 24 (1911), No. 18, pp. 858, 859; abs. in Analyst, 36 (1911), No. 424, p. 361*).—Crude and refined soy-bean oils were examined by the authors, with the result that the iodin and saponification values and melting points of the fatty acids obtained were found to be quite different from those usually reported in the literature.

The congealing point as given by De Negri and Fabris (+8 to +16° C.) is deemed probably due to a typographical error.

Alcohol from agaves, A. Pedroso (*Jour. Agr. Trop., 11 (1911), No. 116, p. 64; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 677, 678*).—The results of a test show that 360 liters of alcohol were obtained from 2,160 liters of *Agave rigida elongata*, or henequen juice, with a specially prepared yeast. The preparation of alcohol from the juice of zapupe is also mentioned.

METEOROLOGY—WATER.

Relation of temperature and rainfall to crop systems and production, J. F. Voorhees (*Tennessee Sta. Bul. 91, pp. 23, figs. 16*).—A number of charts prepared from reports of the Weather Bureau of this Department are given which show the length of the growing season from the last killing frost in spring to the first in fall, and the distribution of rainfall in Tennessee and other Southern States as well as in the north Central States. The meteorological conditions, as shown by these charts, are discussed with reference to the growth of crops in Tennessee and other States, more particularly the relation between climate and the double cropping system of the South.

In this system as practiced at the Tennessee Station and to a greater or less extent by the most successful farmers in the State "the winter cover crop is sown during the comparatively dry months of September and October and occupies the ground through the wet months of winter and early spring. It is ready to be turned under for green manure in March or April or to be cut for forage during May, which is drier than the months either before or after it and offers the most favorable opportunity for harvesting one crop and putting in another. This second crop put in in May covers the ground during the wet summer months, protects it from washing rains when they are most frequent, and is ready to harvest during the drier months of fall. In extending this study to cover the States east and south of Tennessee, it was found that the conditions are more favorable for the double-cropping system over this region as a whole than they are in Tennessee where the system originated." The system is especially adapted to the Southern States because it conserves the rainfall during the wet periods which occur both in winter and in summer and brings crops to maturity in the dry spring and fall periods.

Crop rotations which are suited to the double cropping system are described.

The influence of the weather on the quality of barley, potatoes, and sugar beets, A. Hecker (*Landw. Jahrb., 41 (1911), No. 3–4, pp. 417–526, figs. 3*).—Data for sums of temperature, sunshine, and rainfall from April to October, 1883 to 1907, for 11 stations in beet and barley growing regions are given and correlated with the yield and quality of barley, potatoes, and sugar beets.

With reference to barley, the conclusion was reached that a dry July is favorable to the quality of the grain. Moderate, somewhat less than normal, moisture combined with medium or perhaps below normal temperature affords the surest guaranty of good results in yield and quality, and it is safe to say that cool June, and especially July, weather is favorable to good quality. The effect of weather conditions is accentuated to a marked degree by the character of the soil. The poorer soils are not only directly but also indirectly unsuited for the culture of brewing barley.

In case of potatoes it was found that very wet weather injured the quality. Very dry weather affected especially the quantity, but also reduced the quality. Dry weather followed by wet was very unfavorable to the quality, and wet

weather followed by dry was very unfavorable to yield. Variable, cloudy, cool, and wet weather in the middle period of growth was not markedly injurious to yield. Low temperatures were apparently not so unfavorable as other factors. Damp, warm weather was invariably injurious to quality. The quality of the medium late and late varieties of potatoes was, as a rule, determined by the weather in August and September.

The results indicate that abundant rainfall from June to the beginning of August is necessary for good yields of sugar beets. Wet summer weather is, however, injurious to quality, while dry weather from August until harvest time is favorable. Sunshine and warmth apparently did not, under the conditions of these experiments, exert a controlling influence on the yield or quality.

The great weather cycle, T. W. KEELE (*Jour. and Proc. Roy. Soc. N. S. Wales, 44 (1910), pt. 1, pp. 25–76, pls. 2*).—In this article evidence drawn from ancient and modern literature is presented to substantiate the theory of H. C. Russell that the salient meteorological features of the present century "are repetitions of the salient points in all past time and probably in all countries . . . [and] that those salient points are definitely connected with the climate of the world and will appear again regularly in the future."

Swedish meteorological observations, 1910, H. E. HAMBERG (*Met. Iakttag. Sverige (Observ. Mét. Suéd.), K. Svenska Vetensk. Akad., 52 (1910), pp. X+157; Bihang, pp. 215, pls. 16*).—These are the usual meteorological summaries of observations made under the direction of the Central Meteorological Institute of Sweden.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and R. N. HALLOWELL (*Massachusetts Sta. Met. Buls. 275 276, pp. 4 each*).—Summaries of observations on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during November and December, 1911, are presented. The general character of the weather for November is briefly discussed, and the December bulletin gives a summary for the year. The principal data in this summary are as follows:

Pressure, reduced to freezing and sea level (inches).—Maximum, 30.72, March 7; minimum, 28.95, March 30; mean, 30.06. *Air temperature*, in ground shelter (degrees F.)—Maximum, 104, July 4; minimum, −3, February 16; mean hourly, 47.6. *Humidity.*—Mean dew-point, 38.3; mean realtive humidity, 75.2. *Precipitation.*—Total rainfall or melted snow, 44.21 in.; number of days on which 0.01 in. or more rain or melted snow fell, 120; total snowfall, 35 in. *Weather.*—Total cloudiness recorded by sun thermometer, 2,023 hours, or 45 per cent; number of clear days, 106. *Bright sunshine.*—Number of hours recorded, 2,431, or 55 per cent. *Wind.*—Prevailing direction, west; total movement, 58,242 miles; maximum daily movement, 605 miles, March 16; minimum daily movement, 14 miles, February 9; maximum pressure per square foot, 30.5 lbs., December 28, north-northwest. *Dates of frost.*—Last, May, 5; first, September 14. *Dates of snow.*—Last, April 19; first, November 14.

Climate of Utah, H. THIESSEN (*Rpt. Bur. Statis. Utah, 8 (1909–10), pp. 49–57*).—The available records for temperature and precipitation are summarized, showing an average temperature for the State of 49° F., 42° in the north and 58° in the south. The coldest month is January, the lowest local mean for this month being 11.8° at Fort Duchesne, the highest 37.7° at St. George. Minimum temperatures below zero are recorded for nearly all stations during all winter months, the lowest, 38° below zero, being at Fort Duchesne in January. "The hottest month as a rule is July, the local means varying from 84.4° at Hite and 82.2° at St. George, to 65.9° at Heber, making the average State

range for July 18.5°. Temperatures of 100° or over have been recorded at most stations in all the summer months.

"On the other hand, most of the stations have a record of freezing temperature during this season. The highest summer temperature on record is 116° at St. George in June, while the lowest is 20° at Richfield, in the same month. The average date of first killing frost in autumn varies from September 2 at Heber to October 28 at Hite, while the earliest date on which frost ever occurred in autumn is August 11 at Heber. The average date of last killing frost in spring varies from April 11 at Hite to June 14 at Heber, while the latest date on which killing frost ever occurred in spring was July 30 at Heber."

The precipitation for the State averages about 11 in., being about 18 in. in the northern and 6 in. in the southern portion. Locally the precipitation varies from 5.43 in. at Green River, to 24.36 in. at Ranch, Kane County. As a rule, the heaviest precipitation occurs in the central portion of the State. The largest amounts fall in winter and spring, and the least in June and October. There are about 50 rainy days in the year. Locally the rainy days vary from 22 at Green River to 89 at Salt Lake City."

Notes on evaporation in 1911, L. Dumas (*Ann. Gembloux, 22 (1912), No. 1, pp. 12–32*).—Observations during August and October, 1911, on evaporation from ordinary cylindrical drinking glasses placed 0.15 meter and 2 meters above the ground are reported.

Discussing the results, it is shown that the amount of evaporation is the resultant of numerous accelerating and retarding factors. Among the first are wind, heat, solar attraction, extension of the superficial area, and low barometric pressure. Among the factors which retard evaporation are oily substances, the mass of the liquid, salt content, cloudiness, lowering of the level of the water, and aeration or the solution of gases. The combination of such diverse causes renders superficial observations on evaporation very contradictory. During the summer of 1911, which was unusually hot and dry, there was appreciable evaporation during the night. With the lowering of temperature, however, evaporation ceased and there was even a slight gain in some cases due to condensation of moisture from the air on the sides of the glasses.

The effect of subsoil water on the cotton crop, W. L. Balls (*Yearbook Khediv. Agr. Soc. Cairo, 1909, Sup., pp. 24*).—This is a brief summary of present information concerning the rise of the water level and its effect on the cotton crop in Egypt.

It is believed that the water table is the main factor in the decrease of the cotton crop and that the rise in water level probably causes boll shedding, a phenomenon which is presumed to be "of great economic importance in its effect on the yield of the crop." The author makes suggestions to growers for conducting and reporting observations on water level, soil texture, and boll shedding, and emphasizes the need of systematic studies of the problem.

An appendix contains a note on a method of taking water levels by F. Hughes in which brief directions are given for determining the nature of the subsoil and water conditions.

Mississippi River levees and their effect on river stages during flood periods, S. C. Emery (*U. S. Dept. Agr., Weather Bur. Bul. 38, pp. 21*).—This paper describes the levee and jetty systems of the Mississippi River, and discusses their effect in raising the flood levels of the river and increasing the depth and extending the area but shortening the period of flooding of the adjacent lands.

Report of water resources investigation of Minnesota, 1909–10 (*St. Paul, Minn.: State Drain. Com., 1910, pp. 347, pls. 66*).—This is the first biennial report of the State Drainage Commission, organized under authority of a joint resolution of the state legislature, approved April 20, 1909, and contains reports by George A. Ralph, chief engineer of the State Drainage Commission, and Robert Follansbee, district engineer, U. S. Geological Survey. These reports deal with cooperative work of the State Drainage Commission and the U. S. Geological Survey, and include "measurements of the flow of water in nearly all of the important streams of the State; surveys, maps, and profiles of nearly 1,000 miles of rivers; evaporation records at five stations in this section of the United States; the preparation of a rainfall map showing the distribution of rainfall throughout the State; the preparation of a watershed map of the State, showing all principal drainage areas and a statement of square miles contained in all principal and subdrainage areas in the State; the collection of a vast amount of data relative to power development and the regulation and control of water resources in other States and European countries; [and] the draft of a proposed law for the creation of a water supply commission, and regulating and controlling the use of the waters of the State."

Surface water supply of the Lower Mississippi basin, 1910, W. B. Freeman and J. G. Mathers (*U. S. Geol. Survey, Water-Supply Paper 287, pp. 91, pls. 2*).—This paper, one of the series on stream measurements in the United States, describes this basin, and gives the results of measurements of flow of the principal streams therein.

Surface water supply of the Missouri River basin, 1910, W. A. Lamb et al. (*U. S. Geol. Survey, Water-Supply Paper, 286, pp. VII+308, pls. 4, fig. 1*).—This is one of the series of volumes reporting results of measurements of the flow of certain streams in the United States, and deals with measurements of the Missouri River and its principal tributary streams.

Surface water supply of western Gulf of Mexico, 1910, W. B. Freeman and J. G. Mathers (*U. S. Geol. Survey, Water-Supply Paper 288, pp. 149, pls. 3, fig. 1*).—This is one of the series of reports on measurements of stream flow in the United States, and gives the results of measurements in the drainage basins of the Brazos, Colorado (in Texas), and Rio Grande.

Underground waters of the southern border of the Valley of Mexico, J. D. Villarello and J. S. Agraz (*Bol. Inst. Geol. Mexico, 1911, No. 28, pp. 89, pls. 13*).—This is a report on the hydrology of this region, including observations on the amount and composition of the underground waters.

The analysis of water for household and municipal purposes, E. M. Chamot and H. W. Redfield (*Ithaca, N. Y., 1911, pp. 130, figs. 4*).—This is stated to be the first of a series of small treatises dealing in an elementary way with the methods used in the laboratory of sanitary chemistry of Cornell University for examination of water and food. The subject matter is devoted to laboratory methods mainly, and is intended to supplement the lecture courses in sanitary chemistry.

The influence of storage and various preservatives upon the dissolved oxygen in waters, A. Lederer (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 10, pp. 740–746*).—From his study of this subject, the author concludes that "the percentage reduction of dissolved oxygen in waters which are stored in tightly closed bottles and exposed to a constant temperature for a definite length of time, constitute a fair index of pollution. To unpreserved samples of polluted waters, the reagents for the determination of the dissolved oxygen must be added on the spot to avoid a reduction. . . . The addition of 1 cc. of 40 per cent formaldehyde solution to a sample of water, even if badly polluted, will preserve the amount of dissolved oxygen present for at least 2 days at

22° C. storage, and for at least 4 days at 10° C. storage. If kept in a dark place, a sample of water taken under the necessary precautions to avoid aeration can be preserved with formaldehyde for a reasonable length of time and shipped to the laboratory without danger."

SOILS—FERTILIZERS.

A beneficial organic constituent of soils: Creatinin (*U. S. Dept. Agr., Bur. Soils Bul. 83, pp. 44, pls. 3*).—This is a continuation of investigations on the nature and properties of the individual organic constituents of the soil (E. S. R., 25, p. 723). The bulletin contains an introduction by Oswald Schreiner on the importance of beneficial soil constituents, and the following papers:

The isolation of creatinin from soils, E. C. Shorey (pp. 11–22).—The method of Balke for the separation of purin bases was adapted to the isolation of creatinin from soils as follows: "An alkaline extract of the soil, made by treatment for a short time with 2 per cent sodium hydroxid, was made exactly neutral with acetic or sulphuric acid and filtered. The neutral filtrate was heated to boiling and a little dextrose added and then Fehling's solution, slightly in excess of that required by the dextrose present. The precipitate formed was separated by filtration, well washed, and decomposed by hydrogen sulphid. The filtrate from the copper sulphid was concentrated to a small volume under reduced pressure, a small quantity of a concentrated solution of zinc chlorid and a little sodium acetate added, and the whole allowed to stand several days. Within a few hours crystals began to form, and in 48 hours these were observed to have the characteristic appearance of creatinin zinc chlorid. The crystals were separated from the mother liquor by filtration or, when the quantity of material was very small, by placing the whole mass on a porous plate. After separation the crystals were washed with a little cold water, suspended in water and boiled with some freshly precipitated lead hydroxid, filtered, and the filtrate concentrated to a small volume; on standing a short time crystals formed having the appearance, solubility, and color reaction of creatinin."

Creatinn was also obtained from portions of the same soil by alcoholic extraction and by extraction with water. The compound was found in stable manure and cowpea vines, and in soils of widely different type and very widely separated areas. It is pointed out that, although the quantity of creatinin in soils is small, it is not negligible, being usually several parts per million of soil and comparable with that of nitrates normally present, and that like the nitrates it is probably a fluctuating quantity.

The origin of creatinin in soils, M. X. Sullivan (pp. 23–32).—The particular phase of the question studied was "the presence of creatinin in plants and consequently in plant débris and the passage of the creatinin into the soil either by the disintegration of the plant débris or as a result of cell sloughing or direct passage from the living plant." It was found that "of samples of the same soil, planted and unplanted, kept side by side in the greenhouse, the planted soils gave larger amounts of creatinin. It would seem that the increase in the amount of creatinin was connected in some way with plant growth. Creatinin was also found in the water in which wheat seedlings had grown. The presence of creatinin in plants has not been previously reported. Various plants were tested for creatinin and its presence definitely ascertained. It was found in wheat grains, seedlings, and bran, in rye, clover, alfalfa, cowpeas, and potatoes. If, as suggested by several investigators, creatinin in the animal arises as the result of the breaking up of albumin, then it seems reasonable to expect that creatinin would be found in practically all plants.

"Creatinin and creatin exist in vegetable matter to a slight degree. Though the amount of these compounds present is small it is worthy of attention, since by the decay of plants and by direct cell sloughing or even by osmosis the creatinin and creatin are left in water and soil where they exercise an effect on subsequent plant growth. Creatinin seems to persist for a considerable time in soils and may indeed increase in the soil by accumulation. Since both creatin and creatinin have a favorable effect on plant growth, their presence in plants and in the medium in which plants grow has considerable bearing on soil fertility."

Effect of creatinin on growth and absorption, J. J. Skinner (pp. 33–44).—Wheat seedlings were grown in aqueous culture solutions containing monocalcium phosphate, sodium nitrate, and potassium sulphate in varying combinations and proportions. "The concentration of all the solutions was 80 parts per million of the fertilizer ingredients, P_2O_5, NH_3, and K_2O. . . . Two sets of cultures were prepared; to one set were added merely the nutrient salts, to a similar set 50 parts per million of creatinin in each culture, in addition to the nutrient salts." The results of these experiments are summarized as follows: "Creatinin and creatin have beneficial effects on plant growth. Plants grown in solution cultures containing only potash and phosphate show greatly increased growth when creatinin or creatin is added. When large amounts of nitrate are present in the culture solutions, creatinin or creatin produce no appreciable effect on the growth. Plants growing in cultures, whether low or high in nitrate, showed a greatly diminished absorption of this ingredient when creatinin or creatin was present, whereas the removal of potash and phosphate was practically normal. It appears, therefore, that creatinin and creatin can replace the effect of nitrate in plant growth."

The isolation of creatinin from soils, E. C. Shorey (*Jour. Amer. Chem. Soc., 34 (1912), No. 1, pp. 99–107*).—Substantially the same article as that noted above.

Some causes of soil granulation, E. O. Fippin (*Proc. Amer. Soc. Agron., 2 (1910), pp. 106–121, figs. 8*).—The effect of alternate drying and wetting, scarification, freezing, addition of sand, muck and muck extract, lime, and acids on soil granulation was determined by measurements of penetration.

The results show that all these methods of treatment promoted granulation of the soil. Caustic lime was more effective for short periods than the carbonate lime in improving tilth.

Notes on soil moisture, C. F. Juritz (*Agr. Jour. Union So. Africa, 2 (1911), No. 6, pp. 739–758, figs. 4*).—The author discusses free, capillary, and hygroscopic water of the soil in relation to plant growth, and reports the results of determinations of the hygroscopic water, organic matter, and nitrogen in typical Transvaal and Cape Colony soils.

The results show that the soils which contained the maxima of water also contained much larger quantities of organic matter in general and of nitrogen in particular. In 23 Transvaal soils which contained the most hygroscopic water there was found an average percentage of water of 9.12; of organic matter, 14.31; and of nitrogen, 0.214. In soils containing the minima of hygroscopic water there was found an average moisture content of 0.75 per cent; of organic matter, 3.25 per cent; and of nitrogen, 0.066 per cent. "In the soils containing the maxima of water, 1.5 per cent of the organic matter consists of nitrogen; in those containing the minima this ratio is higher, namely, 2 per cent." In 63 samples of Cape soils containing the maximum percentages of moisture the amounts of water, organic matter, and nitrogen were respectively 4.67, 8.84, and 0.131 per cent.

The factor which controls the moisture content of the soils is held to be the relative sizes of the soil particles. "The texture of the soil is, therefore, an index of its behavior in relation to moisture in the field. For this reason, amongst others, there is a texture of soil which may be regarded as the optimum for certain plants exactly as there is an optimum proportion of soil moisture for such plants."

Moisture equivalent determinations and their application, L. J. BRIGGS and J. W. MCLANE (*Proc. Amer. Soc. Agron., 2 (1910), pp. 138–147, pl. 1*).—The authors discuss the use of moisture equivalent determinations (E. S. R., 19, p. 416) in soil classification and in interpreting field determinations of soil moisture.

Although it is not urged that the moisture equivalent determinations should supplant any other physical measurements made in connection with soil classification, it is believed that the moisture relationship of the soil is expressed "far more definitely by means of the moisture equivalent than by mechanical analysis. In determining the moisture equivalent, we are not only measuring directly the property which we wish to compare, but we are dealing with single-valued expressions instead of trying to interpret the complex series of numbers represented by the mechanical analysis."

It is pointed out that determinations of the moisture equivalent make it possible to decide whether irregularities in field determinations of soil moisture are due to changes in soil texture or to the movement of soil moisture. "If the ratio of the moisture equivalent agrees with the ratio of the observed moisture content within the limits of experimental error, then the irregularity was due simply to striking a pocket of soil having a different texture, and the 2 samples are in actual capillary equilibrium. If, on the other hand, the moisture equivalents are the same, a movement of moisture has taken place."

Moisture and nitrate relations in dry land agriculture, H. O. BUCKMAN (*Proc. Amer. Soc. Agron., 2 (1910), pp. 121–138, figs. 4*).—The results of determinations of the moisture and nitrate contents in Montana soil plats under different systems of cropping and fallowing used in dry farm practices are reported.

The results in general show that fallowing conserved the water supply and increased the nitrate content of the soil. Intertilled crops after fallow did not seriously deplete the soil for a succeeding grain crop, either in moisture or nitrates. The author believes that enough moisture can be conserved in the soil to cause the decomposition of either green or barnyard manure and that, therefore, the fertility problem of arid lands hinges upon moisture conservation and a rational rotation embracing legumes and manure if the latter is available.

Composition of the drainage water of a soil with and without vegetation, T. L. LYON and J. A. BIZZELL (*Jour. Indus. and Engin. Chem., 3 (1911), No. 10, pp. 742, 743; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 21, p. 1271*).—Determinations of the amount and composition of summer and winter drainage in 1909 and 1910 from concrete pits filled with 3½ tons of clay loam soil, some of which were planted to oats and corn and others left bare, are reported and discussed.

The total solids in the winter drainage from bare soil were 3 times as great as in drainage from planted soil. The nitrogen was 12 times as great, amounting to about 100 lbs. per acre in uncropped soil from October 1 to May 1, and to about 8 lbs. per acre in cropped soil during the same period. Of the cropped soils the largest amount of available nitrogen was found under corn. Nitrate formation occurred largely in midsummer, although nitrates appeared most abundantly in the winter drainage. The loss of calcium was twice as great from bare soil as from cropped soil. Practically the same ratio of loss

also held for magnesia. From 5 to 10 lbs. per acre of potash and 50 to 90 lbs. of soda were lost from bare soils from October 1 to May 1. The basic materials were lost largely in form of nitrates.

Observations on solutions circulating in cultivated soils, G. GOLA (*Giorn. Geol. Prat., 9 (1911), No. 3–4, pp. 131–159*).—The author discusses the relation of composition and concentration of the soil solution to the physiology and the distribution of plants, on the basis of the results of his own work previously reported (E. S. R., 25, p. 21).

On the importance of the reaction of the soil in soil studies and for its productivity, M. WEIBULL (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 5, pp. 388–417; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 1, pp. 61–63*).—Another account of investigations already noted (E. S. R., 25, p. 724).

On the contents of nitrogen and the more important ash constituents in some farm crops grown on peat soils, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 4, Sup. 1, pp. 329–402, pls. 2*).—Compilations of results of analyses made at the Swedish Moor Culture Stations during the past 15 years are given, with a colored chart showing the fertilizer ingredients removed by different crops from 1 hectare of peat soil.

The relation of free living nitrogen-fixing micro-organisms to nitrogen assimilation in meadows, R. BURRI (*Abs. in Chem. Ztg., 35 (1911), No. 77, p. 704*).—Scientific evidence is presented to show that autotrophic nitrogen-fixing organisms play an important part in maintaining the nitrogen supply of meadow soils, and it is further suggested that perhaps the greater part of the present supply of fixed nitrogen on the earth's surface is due to the action of micro-organisms.

The function of humus in cultivated soils, H. KASERER (*Monatsh. Landw., 4 (1911), No. 11, pp. 324–328; Internat. Mitt. Bodenk., 1 (1912), No. 3–4, pp. 367–375; abs. in Chem. Ztg., 35 (1911), No. 118, p. 1103*).—The author maintains as a result of his investigations that the stimulating action of humus on the activities of nitrogen-fixing bacteria, as shown in experiments by Krzemenienski (E. S. R., 22, p. 221) and by Löhnis and Pillai (E. S. R., 20, p. 621), is due to the inorganic nutrients, especially aluminum and silicic acid, supplied to the micro-organisms through the humus.

The theory of soil management, F. K. CAMERON (*Proc. Amer. Soc. Agron., 2 (1910), pp. 102–106*).—The author discusses briefly the different factors which affect crop production, pointing to the fact that all these factors are dependent variables. Plat experiments with fertilizers should take account of the physical and biological properties of the soil at least throughout the growing season. "More important at the present time perhaps is the determination of the kind and degree of the changes produced in different variables by the changes in any one of them."

Experiments with fertilizers and field crops on important soil types of middle Tennessee, C. A. MOOERS (*Tennessee Sta. Bul. 92, pp. 27–95*).—Experiments carried on during 1907 and 1908, reported in a previous bulletin of the station (E. S. R., 21, p. 116), were continued on the same plan during 1909 and 1910. These experiments included fertilizer and cultural tests with corn, wheat, oats, potatoes, peanuts, soy beans, cowpeas, alfalfa, millet, clover, tobacco, tall oat grass, and miscellaneous hay crops on Highland Rim, Central Basin, and Cumberland Plateau soils, the main object of the experiments being to determine the fertilizer requirements of the principal types of soils.

As regards the Highland Rim soils, it is stated that the investigation "has not progressed far enough to permit of accurate distinctions in all respects, but if the dark red soils be placed first in value, then the gray soils with red sub-

soils come next, followed by those with yellowish subsoil, while the least valuable and the most difficult to handle are the light gray, silty soils, which are known as 'crawfishy' and which are apt to be in need of drainage.

"In regard to adaptability to different crops, the dark red areas are especially well suited to wheat, corn, and various forage crops, including clover and grass. The gray soils are excellent for tobacco, peanuts, and various trucking crops; also for corn, wheat, and other general farm crops, although clover and grass are satisfactorily obtained with some difficulty. It should be considered, however, that for all the Highland Rim uplands, manure, fertilizers, and lime are important aids to successful farming."

The experiments show that the Central Basin soils have declined in fertility. This is ascribed "to losses of soil nitrogen and of vegetable matter, owing in large part to erosion during heavy rains and in part to excessive grain growing, together with failure to care for the farmyard manure and the like. . . . The crop rotations followed in this section, although well suited to the rich soil of former years, are not the best under the present circumstances. Grain crops have played a too important part and the legumes, the nitrogen gatherers, have not had the place which they deserve. . . . The following rotation is recommended in particular for the consideration of those engaged in live stock farming: Corn, followed by a winter cover crop, such as rye or crimson clover and rye, soy beans or cowpeas, wheat, clover, and grass (2 years). This is a five-year rotation, which would be expected not only to give remunerative crops but also to do much toward increasing the productiveness of any of these soils."

The experimental results on Cumberland Plateau soils "prove conclusively the great need of lime, phosphoric acid, and nitrogen, but that the supply of potash is relatively abundant, provided due care be taken to keep on the farm the residues from the straw, stover, grass, etc., produced."

Maintenance of soil fertility: Plans of summary tables (*Ohio Sta. Circ. 114, pp. 21, fig. 1*).—This is one of the annual statements on the subject (E. S. R., 23, p. 717) bringing the data for the experiments up to the end of 1910 and summarizing the results for 17 years (1894–1910). The experiments of which data are summarized were with fertilizers and manure on crops grown continuously on the same land in a 5-year rotation of corn, oats, wheat, clover, and timothy; in a potato, wheat, and clover rotation; and with fresh and reinforced manure, lime, and floats.

The composition of Posen soils, and the results of fertilizer experiments, M. Gerlach (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1911), No. 5, pp. 295–330*).—The results are reported of mechanical and chemical analyses of rye, barley, and wheat soils of the region and of 3 seasons' experiments with the ordinary fertilizers on rye, barley, and potatoes.

The results in general point to the need of mineral fertilizers in addition to stable manure. Some soils were poor in lime.

Some practical experiences in moor culture obtained by the Swedish Moor Culture Society, 1887–1909, H. von Feilitzen (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 4, Sup. 2, pp. 94, figs. 97*).—This is a popular summary report based largely upon work at the Moor Culture Station at Jönköping, Flahult, and other places in Sweden.

Fertilizer and field trials with moor soils, 1910, H. von Feilitzen (*Svenska Mosskulturför. Tidskr., 25 (1911), Nos. 4–5, pp. 405–465, figs. 9; 6, pp. 553–601, figs. 3*).—This is the annual report of experiments conducted during 1910 at the Moor Culture Stations at Jönköping, Flahult, and Torestorp.

Cooperative fertilizer and field trials with farm crops, 1910, P. BOLIN (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 7, pp. 538–595*).—The experiments were conducted in 23 different counties of Sweden and include 804 series in all, viz, fertilizer trials with small grains, green forage crops, potatoes, and meadows, and variety tests with grains, legumes, root crops, and potatoes.

Fertilizer experiments to determine the phosphoric acid and potash requirements of meadow soils, U. GRETE (*Landw. Jahrb. Schweiz, 25 (1911), No. 7, pp. 381–469*).—The results of 68 experiments in different parts of Switzerland are reported, showing that in the majority of cases potash and phosphoric acid were beneficial, and that a combination of the two was the most profitable fertilizer to use on meadow soils.

Comparative experiments with farm manures made with different kinds of litter, S. RHODIN (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 7, pp. 529–537; Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 44, pp. 11*).—These experiments were conducted for 8 years (1903–1910) on a stiff clay soil, plats of which were manured in the spring of 1903 at the rate of 35 tons per acre with farm manure made with peat litter, with straw, with even mixtures of these, and with annual applications of artificial fertilizers (285 lbs. Thomas slag, 570 lbs. kainit, and 285 lbs. nitrate of soda). The crops grown were from 1903 to 1907 and in 1909, potatoes; 1908, rutabagas; and 1910, oats.

The total dry matter in the crops harvested from the different plats during this period was as follows: Unmanured, 22,538 lbs.; manure with peat litter, 31,596 lbs.; with straw litter, 30.967 lbs.; with peat and straw litter, 30.912 lbs.; and with artificial fertilizers, 29.474 lbs. The manure made with peat litter produced the largest crops and, economically, the best returns for the period considered. The peat litter manure and the mixed peat and straw manure produced the largest yields the first year, while the straw manure did not produce its maximum effects until the third year of the experiment.

The importance of thorough mechanical treatment of the soil for a large crop production is emphasized in the paper.

The action and value of stable manure, B. SCHULZE ET AL. (*Arb. Deut. Landw. Gesell., 1911, No. 198, pp. 333*).—This is a detailed report of 4 years' field experiments at the Breslau Experiment Station and at other places in Schleswig, a brief account of which has already been noted (E. S. R., 22, p. 716). The experiments were made at eight different places with different kinds of soil and with manures of varying composition. The crops grown included wheat, barley, oats, rye, leguminous plants, rape, flax, potatoes, and sugar beets. In the manures used the nitrogen varied from 0.34 to 0.78 per cent, the phosphoric acid from 0.13 to 0.39 per cent, and the potash from 0.33 to 0.91 per cent.

While the results were variable the average amount of the nitrogen of the manure assimilated during the 4 years was 23 per cent. Of this 43 per cent was assimilated during the first year, 27.8 per cent the second year, 16.6 per cent the third year, and 12.6 per cent the fourth year. Of the phosphoric acid 33.4 per cent was assimilated during the 4 years, and of this 45.1 per cent was assimilated the first year, 27.1 per cent the second year, 14.9 per cent the third year, and 12.9 per cent the fourth year. Of the potash in the manure 43.8 per cent was assimilated in 4 years, of which 57 per cent was assimilated the first year, 15.5 per cent the second year, 12.7 per cent the third year, and 14.8 per cent the fourth year.

The experiments with manure supplemented with commercial fertilizers gave inconclusive results.

The denitrifying action of straw manure, A. G. DOĬARENKO (*Izv. Moskov. Selsk Khoz. Inst. (Ann. Inst. Agron. Moscou), 17 (1911), No. 2, pp. 259–265, pl.*

1, figs. 4).—The results of the pot experiments reported show that straw and ammonium sulphate were to a certain extent mutually compensating in fertilizing effect.

Green manure farming, M. HOFFMANN (*Arb. Deut. Landw. Gesell., 1911, No. 209, pp. 178, pl. 1, figs. 11*).—A detailed account is given of experiments made during 1905 to 1908 on 9 estates in competition for money prizes offered by the German Agricultural Society. No generalization from the work is attempted, as this is to be done in a series of articles which are to appear later. The economics of green manure farming under German conditions receives special attention in the discussion of results. A list of publications of the German Agricultural Society on green manuring is appended.

Manganese chlorid in the treatment of night soil, L. CHAPTAL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 25, pp. 778–782; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, p. 1622*).—The successful use of residue from the manufacture of chlorin in the preservation of night soil is reported and discussed.

The fixation of atmospheric nitrogen, A. BROCHET (*Rev. Gén. Sci., 22 (1911), Nos. 22, pp. 863–869, figs. 2; 23, pp. 908–918, figs. 7*).—This is a review of methods employed in the electro-chemical fixation of the free nitrogen of the air.

The use of cyanamid as fertilizer, L. MALPEAUX (*Jour. Agr. Prat., n. ser., 22 (1911), No. 47, pp. 647–651; abs. in Bl. Zuckerrübenbau, 18 (1911), No. 22, pp. 375, 376*).—Comparative tests of calcium cyanamid, ammonium sulphate, sodium nitrate, and calcium nitrate on cereals, sugar beets, potatoes, rutabagas, and poppy are reported.

The results showed that the effect of the fertilizers varied with the nature of the soil and the meteorological conditions. In general the calcium nitrate was comparable in effect with sodium nitrate, and cyanamid under the conditions of these experiments was slightly superior to ammonium sulphate. An objection to the cyanamid is the difficulty of its application.

On the change of calcium cyanamid in the soil and its after-treatment in the factory, B. CARLSON (*Svensk Kem. Tidskr., 23 (1911), Nos. 3, pp. 63–66; 4, pp. 70–88*).—The history of calcium cyanamid and its application as a fertilizer is given, with a résumé of our present knowledge of its composition and value for fertilizing purposes and the conditions under which deleterious results may follow from its handling and application. In order to avoid the latter treating the calcium cyanamid in the factory with carbon dioxid and water is recommended.

The hygroscopicity of Norwegian nitrate, S. HALS (*Chem. Ztg., 35 (1911), No. 121, p. 1130*).—Determinations of gain in weight and change in composition of Norwegian nitrate in storage are reported, showing that in 312 days 100 kg. of the nitrate gained on an average 3 kg. in weight. The loss in nitrogen was not great.

[Production and consumption of Chilean nitrate], E. FISHER (*Asoc. Sal. Propaganda, Circ. Trimest. 56, 1911, pp. L–LXXVI*).—According to the statistics reported by the Nitrate Propaganda the production of nitrate in Chile during 1910 was 2,722,676 tons and during the first 9 months of 1911, 2,055,780 tons; the world's consumption during 1910 was 2,605,877 tons and during the first 9 months of 1911, 2,260,549 tons. The consumption in the United States in 1910 was 578,808 tons and during the first 9 months of 1911, 509,659 tons.

Experiments with different potash minerals, D. N. PRIANISHNIKOV and A. G. DOÏARENKO (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 17 (1911), No. 2, pp. 218–240, figs. 8*).—In continuation of previous experiments (E. S. R., 24, p. 24) various potash silicates were tested in sand cultures.

The results showed not only orthoclase, sanidine, and microcline, but also leucite to be very slightly available as sources of potash for plants. Biotite and muscovite in finely ground condition were more available than minerals of the feldspar group, although biotite was always more available than muscovite. When pure muscovite was replaced as a source of potash by mica schist containing muscovite, still better results were obtained. Eleolite as a pure mineral in fine ground condition was very slightly assimilated. For this reason the author thinks that the previous good results obtained with rocks containing nephaline were due not to nephaline but to the biotite which was present.

Investigations on the chemical composition of the Plantegaarde salt deposits, 1909, D. J. Hissink and G. B. Van Kampen (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat.* [*Netherlands*], *1911, No. 9, pp. 36–55*).—The results are reported of chemical analyses of samples of salt obtained by borings near Winterswijk, Holland, in a search for potash deposits. The potash content varied considerably, the highest amount being 14.8 per cent obtained from a sample at a depth of about 800 meters. The author believes that although these deposits are not as a rule rich in potash they may become of economic importance.

The power of the neutral salts of potash to convert aluminum silicates into soluble forms, A. A. Stol'gane (*Izv. Moskov. Selsk. Khoz. Inst.* (*Ann. Inst. Agron. Moscou*), *17* (*1911*), *No. 2, pp. 359–363*).—Various minerals containing potash were treated with ammonium chlorid and barium chlorid solutions and the potash extracted determined.

It was found that muscovite and biotite yielded much more potash under this treatment than orthoclase, sanidine, and leucite. This agrees closely with the results of pot experiments. There was, however, one exception, namely, nephaline (eleolite), which yielded considerable potash on treatment with neutral solutions, although in pot experiments the fertilizing effect of this material was very small.

Fertility experiments in a rotation of cowpeas and wheat.—I, The utilization of various phosphates, C. A. Mooers (*Tennessee Sta. Bul. 90, pp. 57–90, figs. 3*).—This bulletin gives the results of comparative tests of acid phosphate, finely ground rock phosphate, bone meal, and Thomas slag on a cowpea-wheat rotation at the station and on 3 other Tennessee farms, with analyses of the soils of the farms and of the phosphates used. All of the soils were poor in lime and all except one were poor in phosphoric acid. In each series of experiments one-half of each plat was limed and the other half was left unlimed.

The first series of experiments, which covered 4 years, was conducted at the experiment station on a Cumberland loam which was deficient in lime but otherwise well supplied with plant food. The second series, also extending over 4 years, was made in Knox County on a reddish yellow silt loam which was somewhat deficient in lime and other plant food. The third series, lasting 3 years, was made in Warren County on a typical gray colored silt loam known to be very poorly supplied with both phosphoric acid and lime and, as a rule, also with nitrogen. A fourth series of experiments, covering only 2 years, was made in White County on a typical dark red soil derived from limestone but known to be naturally deficient in phosphoric acid. The results obtained with wheat in the first 3 series of experiments are summarized in the table following.

Increased yields and calculated profits per acre of wheat after cowpeas and various phosphate applications.

Number of plats included.	Treatment.	Yield of wheat.				Calculated increase of wheat from phosphate.				Annual average quantity of phosphate.	Cost of phosphate.	Calculated profit from phosphate.	
		Unlimed.		Limed.		Unlimed.		Limed.				Unlimed.	Limed.
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.				
	Cowpeas turned under:	*Bu.*	*Tons.*	*Bu.*	*Tons.*	*Bu.*	*Tons.*	*Bu.*	*Tons.*	*Lbs.*			
5	No phosphate..	15.2	0.99	18.2	1.19	.....	.....	.....	.....	.....	.....	.....	.....
8	Acid phosphate.	20.4	1.19	24.5	1.45	5.2	0.20	6.3	0.26	229	$1.83	$3.37	$4.47
3	Steamed bone meal.....	21.6	1.34	24.2	1.55	6.4	.35	6.0	.36	218	3.27	3.13	2.73
5	Phosphate rock.	19.3	1.20	21.1	1.32	4.1	.21	2.9	.13	383	1.53	2.57	1.37
	Cowpeas removed:												
3	No phosphate..	10.2	.61	15.2	.87	.....	.....	.....	.....	.....	.....	.....	.....
4	Acid phosphate.	16.5	.94	20.8	1.17	6.3	.33	5.6	.30	261	2.09	[a]5.34	[a]5.98
3	Phosphate rock.	15.4	.90	15.2	.90	5.2	.29	.....	.03	385	1.54	[a]4.73	[a].77

[a] Value of the increased yield of cowpea hay included.

The results show a distinct tendency of lime "to lower the availability of the rock phosphate but not to affect the acid phosphate. . . . The steamed bone meal, although included among the relatively insoluble phosphates, appears in these experiments to occupy an intermediate place, with returns little inferior to those from acid phosphate, . . . but . . . the nitrogen contained in the meal . . . probably gives it a higher standing than can be attributed to the phosphoric acid alone." The results with Thomas slag, although limited, "are very much in its favor, especially if a large enough application be made to take the place of liming, in which event it promises to be the most profitable of all the phosphates."

A comparison of the relative profits shows that "without liming acid phosphate ranks first, bone meal second, and phosphate rock third in profitableness of returns, whether the cowpeas be turned under for green manure or removed for hay, but any one of the three may be used with profit. Under liming, which is necessary in order to get remunerative crops of clover on these soils, and is therefore fundamental to their most successful management, acid phosphate is easily first, bone meal may be used with profit, but phosphate rock is liable to be used at a loss." The opinion that rock phosphate "increases appreciably in effectiveness with the lapse of time after incorporation with the soil" finds little support in the results of these experiments. "A consideration of the percentage of decrease in yield from the first to the last crop of wheat, for each phosphated and unphosphated plat where the cowpeas were turned under, shows that the unphosphated plats, as an average of the first three series, declined most and that phosphate rock, bone meal, and acid phosphate followed in the order named. . . . There seems . . . to be little promise in phosphate rock on soils like those under consideration, unless liming be omitted, and even then . . . acid phosphate may be much more profitable than the untreated rock."

Sand cultures with different phosphates, I. S. Shulov (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 17 (1911), No. 2, pp. 177–198, figs. 10*).—The results of these experiments agreed with those of previous tests in showing very good effects from many low percentage phosphatic slags. Leached ashes gave good results as a source of phosphoric acid when used with rye straw ash. Birch wood ashes were less effective, but still better than bone meal. When

calcium nitrate replaced one-half of the ammonium sulphate especially good results were obtained in those pots to which bone meal had been applied. Vivianite and pure ferrous phosphate gave very good results. The phosphoric acid of iron and aluminum phosphates showed a relatively high availability, and increasing amounts of calcium carbonate up to 1 per cent of the soil had very little depressing effect on their action, while producing very unfavorable effects on the action of tricalcium phosphate in the form of bone meal and phosphorite. Superphosphate, precipitated phosphate, and Thomas slag were, as in previous experiments, less unfavorably affected by calcium carbonate.

On the after effect on moor soils of Palmaer phosphate, Thomas slag, and superphosphate, H. VON FEILITZEN (*Jour. Landw., 59 (1911), No. 4, pp. 371–374; abs. in Jour. Chem. Soc. [London], 102 (1912), No. 591, II, p. 85*).—These experiments were carried out in wooden casks, sunk in the soil, with thoroughly decomposed moor soil, rich in lime and nitrogen. The pants used were oats, potatoes, lupines, and kohl-rabi.

The Palmaer phosphate appeared to be as effective the second year after application as superphosphate and in fact was in a few cases superior. The after effects of the Thomas slag were more pronounced than in the case of either of the other fertilizers.

Influence of rice bran upon the manurial value of phosphoric acid contained in oil cakes, Y. KIDA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1911), No. 3, pp. 367–379*).—The experiments here reported were undertaken to determine whether the organic phosphorus, which is to a considerable extent in the comparatively unavailable form of phytin in oil cakes, can be made more assimilable by plants by adding to the oil cakes a material like rice bran, which is rich in phytase, an enzym shown by Suzuki et al. (E. S. R., 19, p. 966) to be capable of splitting phytin into a soluble inorganic phosphorus compound and inosit.

It was found that, although phytase occurs in both rape seed cake and soy bean cake, the materials used in the experiments reported, its action is very small. When rice bran was mixed with the oil cakes there was a marked increase in the production of soluble inorganic phosphorus from the organic phosphorus compounds, and the manurial value of the cakes was greatly increased. This result was obtained not only with pressed cakes freed from fats and oils but also with the untreated cakes.

Some bacteriological effects of liming, P. E. BROWN (*Iowa Sta. Research Bul. 2, pp. 49–107, figs. 9*).—These experiments, which were carried out with 20 earthenware pots, each containing 30 lbs. of sifted, fresh, typical Wisconsin drift soil, were designed to determine the effects of applications of ground limestone on certain groups of soil bacteria. The ground limestone was applied in amounts representing ½, 1, 2, and 3 tons per acre, and thoroughly mixed with the soil. Ten pots were left bare and 10 were planted to oats. By means of culture methods, which are fully described, studies were made of the total bacterial content and the ammonifying, nitrifying, dentrifying, and nitrogen fixing power of the soil.

The general conclusions reached were that "applications of lime up to 3 tons per acre lead to an increase in the numbers of bacteria developing on 'modified synthetic' agar. They also produce an increase in ammonification, nitrification, and in nitrogen fixation when these processes are tested by the beaker method. These increases are in all cases almost proportionate to the amount of lime applied.

"Natural increases in numbers of bacteria tend to obscure the effects of applications of lime, while natural decreases make them more pronounced.

"Peptone solutions do not permit of the determining of the largest number of bacteria which will destroy humus with the production of ammonia.

"The beaker method, with dried blood or cottonseed meal for ammonification, with ammonium sulphate or dried blood for nitrification, and with mannite for nitrogen fixation, is eminently satisfactory.

"The ammonification of dried blood or of cottonseed meal runs parallel with the numbers of bacteria while there is very little relation between the ammonification of peptone solutions and numbers.

"Increased nitrification leads to slight accumulations of nitrates in the soil.

"Natural accumulations of nitrates in the soil tend to obscure the differences due to the lime treatment.

"The solution method for nitrogen fixation is quite unreliable.

"Applications of lime increase the yield of oats; ½ and 1 ton per acre very slightly, but 2 and 3 tons to quite a large extent.

"Applications of lime up to 3 tons per acre increase the nitrogen content of the oats crop more rapidly than the yield itself."

The use of street sweepings from Montevideo as a fertilizer, J. SCHRÖDER (*Agros, 2 (1911), No. 11, pp. 315–317*).—Analyses of this material are reported, and its fertilizing value is briefly discussed. The dried material contained 9 per cent of water, 0.3 per cent of nitrogen, 0.35 per cent of phosphoric acid, and 0.6 per cent of potash. The material is considered a valuable fertilizer when not too coarse and freed from stones and other inert matter.

Fertilizers, 1911 (*Lab. Inland Rev. Dept. Canada Bul. 227, pp. 23*).—Analyses of 161 samples of fertilizers collected for inspection during May, 1911, in the Dominion of Canada are reported.

AGRICULTURAL BOTANY.

A study on periodicity in plant growth as related to climatic variations, E. VANDERLINDEN (*Separate from Rec. Inst. Bot. Léo Errera Bruxelles, 8 (1910), pp. 247–323, pls. 16; abs. in Met. Ztschr., 28 (1911), No. 7, pp. 334, 335; Quart. Jour. Roy. Met. Soc. [London], 37 (1911), No. 160, pp. 364, 365*).—Phenological observations covering a period of 14 years on 39 species of plants are recorded, and an attempt has been made to correlate these data with climatological data, experimental evidence, etc.

The greatest differences between actual and normal dates of flowering were noticed in those plants which flower early in the spring. For plants flowering normally in May less difference was noticed, but beginning with June they gradually increased. Heat and radiation are said to be the only climatological factors that sensibly affect the flowering of plants, the other factors being practically negligible except occasionally with summer-flowering plants. The factors that hasten flowering in dormant plants are temperature and radiation above normal for several days. A low percentage of moisture in the air also stimulates flowering, while cold, cloudy weather, with considerable rain, retards it. Favorable or unfavorable conditions retain their effect for some time and they are not entirely counterbalanced by changed conditions.

In general, plants flower at certain times, which are determined to a large extent by heredity, but when blooming is delayed flowers may be brought forth by stimulating effects much lower than would be required for precocious blooming. Autumn and winter climates are said to be without visible effect on spring and summer flowering. Species of plants that normally flower about the same time will, in most cases, be equally retarded or advanced in their actual dates of blooming. Second blooming, as sometimes occurs in late summer or autumn, is not due to earlier climatic conditions. An equal departure from normal temperature has less effect on plants in summer than in spring.

In order that plants may flower a dormant period is necessary, as only then are they susceptible to the factors which are concerned in the opening of the flowers. In his experimental studies the author found that dormant twigs placed for several hours in hot water (28 to 30° C.) had their buds forced, while those not dormant were insensible to the treatment. Placing them in hot air also stimulated shoots, but the stimulus did not continue so long as on treatment with hot water.

Phenological observations are held to furnish only approximate results concerning the effect of climatic influences on plants.

The influence of light on the transpiration of succulent plants, LECLERC DU SABLON (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 24, pp. 1236–1238*).—Experiments were conducted with a number of species of succulent plants to determine the effect of diffused and direct sunlight on their respiration, the claim having been made that sunlight increases the transpiration of chlorophyll-bearing plants only, while diffused light tends to increase the transpiration not only in green but also in etiolated plants.

It was found that diffused light when compared with darkness exerted a greater influence than did direct sunlight when contrasted with diffused light. The stimulating effect of direct sunlight is held to be a result of the increased temperature following the exposure of the plant to the full effect of sunshine.

On the influence of ultraviolet rays on vegetation, J. STOKLASA ET AL. (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 16–22, pp. 477–495, pls. 4*).—Continuing previous contributions (E. S. R., 25, p. 125) the authors report further researches with the shorter wave lengths as related to chlorophyll synthesis, protoplasm destruction, and leaf development, with results as follows.

Seedlings of pea, corn, oats, and rye grown in darkness for 10 days and then exposed to waves of from 0.000250 to 0.000575 mm. in length showed a distinctly green color in 2 hours, while those exposed to direct sunlight remained a pale yellow. After 6 hours' exposure, however, both showed a deep green of about the same intensity, and thereafter the rates of change were about equal. Seedlings grown in darkness for about 21 days appeared to have been so weakened that these rays produced only slow and slight change in this experiment. Etiolated leaves of the sugar beet were exposed for 13½ hours to rays of from 0.000250 to 0.000575 mm. length, others for 14 hours to diffused daylight, while still others were kept in darkness as controls. On comparison it was found that the leaves of the control plants were distinctly yellow and the edges curled sharply back upon the lower side, the primary veins being prominent while the secondary veins were scarcely noticeable. The leaves which had been exposed to daylight were of a greenish yellow, the edges were a little curled, the secondary as well as the primary veins being quite distinct. The leaves exposed to the short wave lengths were of an intense green, completely unrolled, and sharply crisped at the edge, both primary and secondary nerves being very distinct and prominent. These leaves were unusually stiff and somewhat brittle, and when cut off and placed in water retained their fresh appearance for a week, whereas those of the other 2 groups did not last half so long.

Most of the wave lengths used in the above experiments were between 0.000300 and 0.000400 mm., but experiments were conducted also with the mercury-quartz lamp without the protective globe, giving additional wave lengths shorter than 0.000300 mm. These showed practically the same results in chlorophyll formation as previous ones, and apparently these shorter waves have no influence in this regard. No destruction of chlorophyll was noted after 2 hours' exposure. Young green leaves of different plants exposed to these direct rays for 2 hours showed a deep green color. In 4 hours they

had begun to shrivel, and in from 1 to 5 days' exposure to diffused daylight those parts of the leaves which had been directly exposed died. The rest remained green, and the plant put out new leaves. Only the epidermal cells of the upper side of the exposed leaves turned brown, the cells beneath showing no change.

Similar experiments with flowers showed them to be much more sensitive to the short rays than are leaves. Both flowers and leaves of hothouse plants were much more sensitive to short waves than those grown in the open. Neither color of the flower nor kind of plant seemed to bear any regular relation to the power of resistance to the rays. Alcoholic solutions of chlorophyll showed no alteration of spectrum after an exposure of from 5 to 60 minutes.

The mycoplasm of bacteria was most sensitive to the influence of the ultraviolet rays. Under exposure to direct rays for from 8 to 10 seconds all cultures tried were killed, while none appeared to be killed by 300 seconds' exposure to the rays which passed through mica plates.

The effect of different luminous radiations on the movement of zoospores of Chlamydomonas, P. DESROCHE (*Compt. Rend. Acad. Sci.* [*Paris*], *153* (*1911*), *No. 18, pp. 829–832, dgm. 1*).—After subjecting Chlamydomonas to different portions of the solar spectrum, the author found that the radiation absorbed by the chlorophyll in the alga was of 2 classes. One group excited the movement, while the other checked or in some cases entirely inhibited it.

The effect of absolute darkness on the growth of plants in laboratories, J. FRIEDEL (*Compt. Rend. Acad. Sci.* [*Paris*], *153* (*1911*), *No. 18, pp. 825, 826*).—The author, by means of specially constructed boxes, claims to have been able to secure absolute darkness under conditions that would permit of plant growth.

He found that it exercised a decided effect on the morphological development of the plants, exaggerating all the characters that are accompaniments of etiolation. The absence of light seemed to have no effect on the formation of anthocyanin in red cabbage, castor bean, spinach, and in cuttings of Achryanthes. Absolute darkness was found to exert a definite effect on the germination of lentils, the leaves being much smaller, the internodes less numerous, and the stem less angular than where grown under the darkness obtained by black screens. Onion bulbs grown under complete darkness were completely deprived of chlorophyll, although ordinary darkness is not sufficient to prevent these plants from taking on a green coloration.

The occurrence of hemagglutinin in plants, M. VON EISLER and L. VON PORTHEIM (*Ber. Deut. Bot. Gesell., 29* (*1911*), *No. 7, pp. 419–430*).—According to the authors, hemagglutinin is found present in various species of 2 genera of Euphorbiaceæ, 1 of Solanaceæ, and 6 of Leguminosæ. The substance is present in the cotyledons or in the endosperm and very evidently acts as a reserve material for the development of the seedlings.

Is iron indispensable to the formation of conidia of Aspergillus niger? M. JAVILLIER and B. SAUTON (*Compt. Rend. Acad. Sci.* [*Paris*], *153* (*1911*), *No. 23, pp. 1177–1180*).—*A. niger* was grown in solutions containing iron and various other substances. In the absence of iron and in the presence of a relatively high amount of zinc no conidia were formed. Later it was found that the zinc was the cause of this behavior. The authors claim that iron, although a very important element for the growth of molds, is not fundamentally necessary for the formation of conidia and their pigmentation.

The influence of calcium on the development and ash constituents of Aspergillus niger, Mlle. ROBERT (*Compt. Rend. Acad. Sci.* [*Paris*], *153* (*1911*), *No. 23, pp. 1175–1177*).—The author describes experiments on this mold, which was grown in Raulin medium to which was added various quantities of lime.

It appears that calcium did not favor the development of *A. niger*, or at least, if it did, it was when it was present in such small quantity as not to be recognized by the methods adopted. Calcium was fixed completely when present in small quantity in solution, and partially when the strength of solution was greater. The increase in weight under these conditions is taken simply as a result of the increase in the amount of calcium in the ash.

On the presence of barium in the ash and extract of certain Kansas weeds, E. H. S. BAILEY and L. E. SAYRE (*Trans. Kans. Acad. Sci., 23–24 (1909–10), pp. 194–198*).—On account of the suggested relation of barium to certain diseases, a study has been made of the ash and extract of a number of species of plants to determine the presence of barium, manganese, magnesium, and other constituents.

Of 16 species of common weeds, barium was found in elder, ragweed, *Aplopappus ciliatus*, *Oxytropis lamberti*, and agrimony.

Some laboratory experiments are reported, in which the effect of barium in an extract of Astragalus upon guinea pigs was studied. These seem to indicate that while barium may be a factor in producing disease, there is another principle in the Astragalus that acts as a poison.

The effect of tarring roads on the growth of trees in the Bois de Boulogne, C. L. GATIN (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 3, pp. 202–204*).—An account is given of observations made upon catalpa (*Catalpa bignonioides*) and 2 forms of *Robinia pseudo-acacia*, in which studies were made of the leaves of these trees along roads that had been given coatings of tar and along those which had not. In nearly every instance it was found that the normal plants had a much greater leaf development than where they had been subjected to the vapor and dust from tarred roads.

The author proposes an experimental investigation on the effect of the dust and vapor from oiled or tarred roads on plants.

The experimental reproduction of the injury to plants by the vapors and dust arising from tarred roads, C. L. GATIN (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 15, pp. 688–690*).—In continuation of the above studies, the author covered the leaves of maple, lilac, walnut, ash, red currant, rose, and others with the dust such as arises from tarred roads, applying it once a week from July 1 to 18, and afterwards 2 or 3 times a week until the middle of September.

All the plants showed the effect of the application, the leaves of the ash and the walnut being burned, while the young leaves of the maple were scorched and perforated and the old ones were turned brown. The effect of the treatment on the rose, in reducing the length of the leaves and the number and size of the leaflets, is also shown.

Anatomical modifications produced on plants by dust from tarred roads, C. L. GATIN and FLUTEAUX (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 21, pp. 1020, 1021*).—Studies were made in July and in October of leaves and branches of catalpa and 2 forms of locust, in which it was found that the plants which had been submitted during the season to dust from tarred roads had become considerably modified. The leaves were reduced in size, the parenchyma very much changed, the axial cylinder modified, and in the branches the medullary rays were greatly reduced. Plants under certain conditions seemed to protect themselves against the injurious action of the dust by the development of suberized tissue. The action of the dust on trees is a gradual one, and in the case of catalpa it was found to result in the complete removal of reserve starch.

Floral anomalies in Japanese hops and hemp due to early seeding, J. TOURNOIS (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 21, pp. 1017–*

1020).—Attention is called to abnormal occurrences in the flowering of these plants, the author stating that if they are planted very early, that is toward the close of winter, the first flowering will take place when the plants are very young, followed by a second normal flowering period. During the first period the anomalous changes in sexuality of the flowers appear.

On the variations in tuberous Solanums, P. BERTHAULT (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 18, pp. 827–829*).—In continuation of previous investigations (E. S. R., 22, p. 626), the author has studied the variations observed in a number of wild and cultivated species of tuber-bearing Solanums.

The variations brought about through cuttings or buds of the wild species as well as of *S. tuberosum* are not considered to be of sufficient importance to warrant the assumption of their origin from the same species. There was nothing found that would confirm the assumption that *S. commersonii*, *S. maglia*, or *S. tuberosum* present forms that are closely allied. The variations secured through seed of *S. tuberosum* were found never to give characters that were completely new but were new combinations of existant characters. This is held to be due to the fact that the agricultural varieties of potatoes are in the nature of hybrids and do not produce mutations.

Further experiments on the inheritance of "doubleness" and other characters in stocks, EDITH R. SAUNDERS (*Jour. Genetics, 1 (1911), No. 4, pp. 303–376, pls. 2, figs. 2*).—A continuation of previous experiments (E. S. R., 21, p. 45).

Double stocks are said to be completely sterile, forming neither pollen nor ovules, and consequently they are always obtained from seed set by singles. The results of the investigations thus far carried on show that the relationship of the various factors concerned is by no means simple. The author claims that her statement of inheritance may be considered as a useful working hypothesis, although it may have to be tested by further experiments along several lines.

An attempted analysis of parasitism, D. T. MACDOUGAL (*Bot. Gaz., 52 (1911), No. 4, pp. 249–260, figs. 6*).—The author states that about half of the total number of seed plants use complex food material which is derived from other organisms, either by mycorrhizal or parasitic arrangements. So far as his observations go, it appears that dependent species which are advantaged by contact or association with other species undergo somatic modifications, consisting chiefly of atrophies or reduction of the shoots and root system, and that in plants of fixed parasitic habit, these reductions may bring about the total disappearance of the roots and reduce the shoot to a simple, unbranched, chlorophyll-less stem, upon which the leaves are represented by colorless bracts.

In investigating the conditions under which 2 species may enter into the relation of host and parasite, the author found that in all cases the osmotic ratio between the sap of the 2 plants was the ruling factor. One plant can not become parasitic on another except by the aid of a superior osmotic pressure which withdraws solutions from the tissues of the enforced host. It is concluded that the evolutionary movement is generally toward increased dependency of the parasite, accompanied by accentuated and more or less complete atrophies. The view that such a movement may sometimes ultimately lead to extinction seems justifiable by influence.

Induced and occasional parasitism, D. T. MACDOUGAL (*Bul. Torrey Bot. Club, 38 (1911), No. 10, pp. 473–480, pls. 4*).—Continuing a previous account (E. S. R., 24, p. 428), the author describes the further development of a number of species of plants which had been placed in condition for parasitism on several species of cactus.

It was found in his experiments, which were carried over 4 years, that plants may be induced to live as parasites when they are subjected to the necessity of securing their nutrition from the host and also of maintaining their turgidity as a necessary condition of growth and other constructive processes. The change from an autophytic to a parasitic condition is apparently one that may be readily made by many species of plants.

FIELD CROPS.

Proceedings of the American Society of Agronomy (*Proc. Amer. Soc. Agron., 1 (1907–1909), pp. 238, figs. 9*).—This volume contains in condensed form the minutes of meetings of the American Society of Agronomy, held in Chicago, Ithaca, Washington, and Omaha, together with 39 of the 69 scientific papers presented at these meetings, as follows:

Development and Proper Status of Agronomy, by M. A. Carleton; The Necessity for Greater Care in the Identification of Crop Varieties Used in Experimental Work, by C. V. Piper; The Testing of Varieties as Foundation Work in the Improvement of Farm Crops, by R. A. Moore, by A. T. Wiancko, and by A. M. Ten Eyck; Some Desirable Precautions in Plat Experimentation, by H. J. Wheeler; The Interpretation of Field Experiments, by C. E. Thorne; The Size of Experiment Plats for Field Crops, by F. W. Taylor; Some Experiments to Determine the Uniformity of Certain Plats for Field Tests, by J. O. Morgan; The Use of Row Plantings to Check Field Plats, by V. L. Cory; Breeding, Multiplying, and Distributing Improved Seed Grain by the Experiment Station, by A. M. Ten Eyck; Plat Arrangement for Variety Experiments with Corn, by L. H. Smith; Selection in Vegetatively Propagated Crops, by W. J. Spillman; The Row Method and the Centgener Method of Breeding Wheat, Oats, and Barley, by C. P. Bull; The Relation Between the Size of Seeds and the Yield of Plants of Farm Crops, by C. A. Zavitz (see below); Methods of Studying the Relative Yielding Power of Kernels of Different Sizes, by W. M. Jardine; The Relation of Wheat to Climate and Soil, by T. L. Lyon; Some Experiments in Breeding High-nitrogen Wheat, by R. W. Thatcher; Factors which Determine the Composition of Wheat, by R. W. Thatcher; Delayed Germination of Durum Wheat, by L. R. Waldron; Experiments in Growing Alfalfa from Seed Secured from Different Sources, by J. M. Westgate, and by A. Mackay; Sowing Alfalfa and the Common Clovers with and without a Nurse Crop, by R. A. Moore; The Soy Bean as a Farm Crop, by C. A. Mooers; Basis for Estimating the Yield of Hay, by W. J. Spillman; Weed Control by Means of Chemical Sprays, by H. L. Bolley; Value of the Field Study of Soils, by G. N. Coffey; Physical Principles of Soil Classification, by G. N. Coffey; Methods of Soil Surveying, by E. L. Worthen; Relation of Soil Surveys to Crop Surveys, by E. O. Fippin; How Can Our Soil Surveys be Made of Greater Value to Agriculture? by W. H. Stevenson and by A. M. Ten Eyck; Increase in the Practical Efficiency of the Soil Survey, by E. O. Fippin; Instruction in Soil Physics, by A. G. McCall; The Soil as a Limiting Factor in Crop Production, by W. J. Spillman; Availability of Soil Nitrogen in Relation to the Basicity of the Soil and to the Growth of Legumes, by T. L. Lyon; Some Conditions Affecting Nitrification in Dunkirk Clay Loam, by J. A. Bizzell; Some Results with Lime on Missouri Soil, by M. F. Miller; and Some Soil Problems in Oklahoma, by L. A. Moorhouse.

The relation between the size of seeds and the yield of plants of farm crops, C. A. Zavitz (*Proc. Amer. Soc. Agron., 1 (1907–1909), pp. 98–104*).—This paper presents full data obtained in tests of the yielding power of large, medium, and small seeds of oats, barley, field peas, spring and winter wheat, mangels, sugar beets, swedes, fall turnips, field carrots, rape, and potatoes.

The author concludes from experiments conducted during the past 14 years that "it seems very evident that large seeds will give a greater yield than an equal number of small seeds, in the case of each of at least 12 different classes of farm crops."

Experiments with rice and secondary crops, J. E. VAN DER STOK (*Meded. Dept. Landb. [Dutch East Indies], 1910, No. 12, pp. VI+243*).—The experiments reported in this publication were made with rice, cassava, peanuts, and sweet potatoes.

Observations on the blossoming and the fruit development of the rice plant showed that in Java the blossoms do not open before 6 o'clock in the morning or after 3.30 o'clock in the afternoon. The greater number of blossoms opened from 10 to 12 o'clock, but a large number also opened from 9 to 10 and from 12 to 1 o'clock. In general, the number of undeveloped kernels was greater in the larger than in the smaller heads. A table is given showing how different varieties and strains of rice may differ in this particular and that, as a rule, the number of abortive blossoms in the head increases from above downwards.

Tests in which seed rice was divided into light and heavy kernels by means of a chemical solution of high density showed that the method applied to the common varieties does not insure better results from the heavier kernels. In pure strains the heavier seeds were observed as generally superior to the lighter ones, but this is believed as having been due at times to greater regularity and uniformity of stand.

Studies on correlation indicated that up to a certain point thickness of the kernel appears to be quite regularly correlated with its length, breadth, and weight. The grouping of the kernels according to length, breadth, and thickness showed that the greatest thickness coincided with the largest average weight per kernel, while in the other two groups the result did not show a similar coincidence. The results of various groupings based on these different factors indicated in general that the average thickness and the average length of the kernel stand in better correlation with its weight than does the average breadth. These observations were made on unhulled grain of pure strains, but the results were found to apply also to the hulled kernels. It was further observed that the upper portion of the head produced kernels greater in average weight and thickness than were produced by the middle portion, and that the lower portion ranked last in this regard. It was further indicated by the results that the average weight of hulled and unhulled kernels decreases as the number of grains per head, including fully developed and incompletely developed grains, increases.

The results of observations on the transmission of characters in hybrid forms of rice are discussed at some length, and tables are given showing the variation between pure strains in the number of heads per plant and kernels per head. Special attention is given in this discussion to the transmission of color.

The results of observations on cassava include variations in the yield of roots and tops expressed absolutely and on a percentage basis. It was noted that the seedlings with the higher root production, when propagated asexually, produced a higher average yield of roots than seedlings low in root yielding capacity. A collection of 53 different varieties and strains of cassava, including 21 native varieties, is briefly described. Of the native varieties only 7 have been observed to produce blossoms. A descriptive classification of the different types and varieties is presented and the yields of different varieties in a comparative test are tabulated.

Similar experiments and observations, including breeding experiments in the operation of Mendel's law in this connection, were made with peanuts.

A variety test of sweet potatoes is reported and the different varieties are described.

Report of the Aligarh Agricultural Station of the United Provinces of Agra and Oudh, for the year ending June 30, 1911, A. E. PARR (*Rpt. Aligarh Agr. Sta. United Prov. Agra and Oudh, 1911, pp. 6+II*).—Earlier work at this station has already been noted (E. S. R., 24, p. 142).

In each of a number of tests cotton of the white-flowered type gave larger yields than that of the yellow-flowered type. Variety tests of wheat, sugar cane, and peanuts are also reported. There was little difference in the yields of sorghum sown broadcast and that planted after the plow in rows 1 ft. apart.

Variety selection of hoed crops and leguminous plants and the methods of variety testing, K. VON RÜMKER (*Tagesfrag. Mod. Ackerbau, 1911, No. 6, 2. ed., rev., pp. 53, pls. 6*).—Variety selection with reference to potatoes, fodder beets, sugar beets, and other hoed crops, together with leguminous plants, oil-producing plants and maize, is discussed at some length and the value of prevailing methods of variety testing is considered.

The dry matter content in root crops and the best methods of its determination, P. BOLIN (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 4, pp. 286–318*).—The author studied the loss of weight of roots kept in storage from 2 to 60 days, the variation of dry matter content in varieties and individual specimens, the porosity of the roots, the evaporation of water during the preparation of samples, and the degree of fineness of the samples in their relation to the results of dry matter determination in ruta-bagas, mangels, and fodder beets. Analytical results secured in this connection are reported and a description of the methods of analysis recommended is given in German.

The principal object of the work was to determine whether or not the dry matter content of roots is in correlation with the percentage of tops or with the weight of the roots. The work was done with 5 varieties each of ruta-bagas and fodder beets and 6 varieties of mangels, from 19 to 24 roots being included in each comparison. The results obtained are recorded in tables.

The data secured indicated a correlation between the percentage of tops and the dry matter content of the roots, although the relation did not always appear in the individual root. The correlation between the dry matter content and the weight in the roots was less regular, and for this reason it is suggested that in sampling root crops quite as much importance be given to an average percentage of tops as to the prevailing average size.

Manurial and variety tests with roots, G. DE S. BAYLIS (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 4, pp. 286–290*).—A table states the results obtained in tests with mangels, swedes, and carrots. The data are tabulated under the heads of soil, cultivation, inter-cultivation, manure, and yield.

On seed production with forage plants and some related questions, A. ELOFSON (*Sveriges Utsädesför. Tidskr., 21 (1911), Nos. 3, pp. 127–164; 5, pp. 257–301, pls. 4, figs. 10*).—The author discusses seed production in Sweden, and describes the production of grass, clover, and alfalfa seed in other European countries. The seed improvement associations, possibility of the exportation of seeds from Sweden, and the preparation of seeds are also discussed.

Report of an experiment on the renovation of poor pasture land carried out at several centers, T. MILBURN and R. C. GAUT (*County Council Lancaster Ed. Com., Agr. Dept., Farmer's Bul. 22, pp. 25, pl. 1*).—This work, which was conducted on several farms in different localities, indicated an advantage in the use of wild white clover in preference to ordinary white or Dutch clover in cow pastures. Lime gave decidedly satisfactory results at only one center. Generally the character of the original herbage was only slowly affected where the dressing used was of cob lime, ground lime, or ground limestone. Upon the

whole, phosphates proved the most effective fertilizers in improving pastures. Basic slag, superphosphate, and boiled bones did uniformly well. Potash made no marked improvement.

Varieties of corn in Ohio, G. T. ABBOTT (*Ohio Sta. Circ. 117, pp. 23–67, figs. 35*).—This study of the geographical distribution in Ohio of 27 varieties or strains of corn is offered as a contribution to the agricultural survey of the State. Notes on the several varieties present historical information and state their cultural and varietal characteristics.

J. S. Leaming and his corn, W. A. LLOYD (*Wooster, Ohio, 1911, pp. 20, figs. 10*).—This paper gives a biographical sketch of J. S. Leaming and a brief history of the Leaming corn. Notes are given on the distribution and adaptation of this variety in a number of the corn growing States.

Maize experiments at the experimental farm, Potchefstroom, T. O. BELL (*Agr. Jour. Union So. Africa, 2 (1911), No. 4, pp. 435–446, figs. 6*).—Rainfall data for 1909–10 are followed by reports of variety tests of corn during these years and during the 5 crop seasons 1906–1911. During the 6 years' experiments corn planted in rows 2 ft. apart gave greater yields than when the rows were farther apart.

A new breed of maize: The "Mercer," J. BURTT-DAVY (*Agr. Jour. Union So. Africa, 2 (1911), No. 3, pp. 318–321, figs. 3*).—The author describes a new white dent corn thought to have originated by the accidental crossing of Hickory King and Virginia Horsetooth.

Cotton: From the raw material to the finished product, R. J. PEAKE (*London, Bath, and New York, [1911], pp. IX+122, pls. 3, figs. 17*).—This book deals with cotton as the basis of a great English industry, giving special prominence to the manufacture of cotton goods and related phases. The English cotton trade and the production and marketing of American cotton are also discussed.

On the relation between weight, specific gravity, and dry-matter content of mangels, R. K. KRISTENSEN (*Tidsskr. Landbr. Planteavl, 18 (1911), No. 2, pp. 277–309, figs. 4*).—The results obtained by the author in examinations of mangels grown at the Askov Experiment Station during 1909–10 showed that there is a general definite relation between the weight of mangels and their content of dry matter. On the average, an increase of 10 gm. in weight was found to be accompanied by a decrease in the percentage of dry matter of 0.014 per cent. When roots are grown under the same conditions there appears to be a correlation between the specific gravity and the dry-matter content that may be expressed by a simple formula, provided a sufficient number of roots are classed together, so that individual variations are done away with, but if the roots are grown under different conditions the relation between the specific gravity and the dry-matter content will be variable.

Trials of the sampling of roots by crushing and by sawing or grating showed that if the saw teeth are sharp similar results are obtained as to the percentage of dry matter in the roots.

Potato improvement work at Svalöf, F. LUNDBERG (*Sveriges Utsädesför. Tidskr., 21 (1911), No. 4, pp. 205–225*).—The author gives the history, general principles, and methods of the improvement work with potatoes at Svalöf, with the main results obtained up to and including the year 1910 in developing new strains of potatoes for factory and table purposes.

Marsh potato (Solanum commersonii), A. J. HANSEN (*Tidsskr. Landbr. Planteavl, 18 (1191), No. 2, pp. 310–316*).—In tests of the improved marsh potato imported from France and the Blaa-Kämpe potato, the latter produced the larger yields during each of the 2 to 4 years during which the tests were conducted at 3 Danish plant culture stations.

The improvement of local rice (*Jour. Bd. Agr. Brit. Guiana, 5 (1911), No. 2, p. 87*).—This is a report of 7 years' tests of a number of local and imported kinds of rice.

Wild rice in tropical Africa, A. CHEVALIER (*Bul. Mus. Nat. Hist. Nat. [Paris], 1910, No. 7, pp. 404–408*).—A botanical study of *Oryza barthii*, with references to the literature of the subject.

The soya bean of Manchuria, N. SHAW (*Shanghai: Insp. Gen. Customs, 1911, pp. 32, pls. 8, fig. 1*).—This is a manual of information on the varieties, production, uses, and products of the soy bean. The author deals with its uses both in the far East and in the western world.

The soy bean in India, D. HOOPER (*Agr. Ledger, 1911, No. 3 (Veg. Prod. Ser. No. 114), pp. 17–33*).—These pages very briefly review soy-bean experiments, races and varieties, and cultural methods in India.

Experiments on the influence of common salt and green manuring on the yield and composition of the sugar beet, together with their residual effect, J. C. DE RUIJTER DE WILDT, D. MOL, and A. D. BERKHOUT (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1911, No. 10, pp. 94–122*).—In these experiments common salt was applied at the rates of 150, 225, 300, 375, and 450 kg. per hectare in connection with the culture of sugar beets. The highest yield was secured where an application of 300 kg. per hectare (267 lbs. per acre) was made. The sugar content of the beets on this plat was not perceptibly affected and, therefore, the total yield in sugar was also heaviest with this application.

In the green manuring experiment, vetch, serradella, and yellow lupines were used. Half of each field was plowed under in the fall and the other half in the spring. In addition to this treatment a general application of commercial fertilizers was given the entire tract. The sugar beets grown on these plats were the more vigorous where vetch had been turned under, and these plats also furnished the highest yield of beets. The fields on serradella and lupine plats were about the same but smaller than on the vetch plat. With vetch plowing under in the spring, and with the other two crops turning under in the fall, seemed to have the most favorable effect. The sugar content in all three cases was highest on the spring plowing, the difference being greatest on the yellow lupine plat where it amounted to about 1 per cent. The results as a whole showed the highest sugar content on the serradella plat, the next highest on the yellow lupine plat, and the lowest on the vetch plat. When the yield and sugar content were both taken into consideration there was practically no difference in the total sugar production on the spring and the fall plowing.

The following year these plats were sown with Chevalier barley. The vetch plat again gave the largest yield. In this experiment turning under the green crop in the spring did not give as favorable results as where the crop was turned under in the fall.

In a third test, sugar beets were grown on land which had been flooded with sea water, and contained, as shown by analyses, 35,000 kg. of common salt per hectare to a depth of 60 cm. The composition of these beets showed that the salt content of the soil had reduced the sugar content, changed the relation of potassium and sodium by greatly increasing the sodium content, and increased the chlorin and ash content. Although an increase of albuminoid nitrogen had taken place, the increase in the nonalbumioid nitrogen was so much greater that the relation between the two had been disturbed.

The sexual reproduction of sugar cane, G. WILBRINK and F. LEDEBOER (*Meded. Proefstat. Java-Suikerindus., 1911, No. 6, pp. 61–88, pls. 5*).—This article describes the process of blossoming and fruit setting in the sugar-cane

plant and gives detailed directions for carrying on hybridization work and the subsequent seed production from the seed secured.

A bibliography of 27 references is appended.

Yearbook of sugar manufacture, J. Bock (*Jahresber. Zuckerfabrik. [Stammer], 50 (1910), pp. XI+319, figs. 11*).—This publication is a compilation of articles with reference to the agricultural and the technical phases of the beet sugar industry for the year 1910. In addition to this matter statistics regarding production and manufacture in the different countries of the world and reviews of the laws passed bearing on the beet sugar industry are presented.

Report on tobacco culture in Montgomery County, L. R. Neel (*Tennessee Sta. Bul. 93, pp. 114–116*).—This is a report on the status of tobacco culture in a typical tobacco county in the dark tobacco district.

The author discusses the preparation and cultivation of the land and seed selection. He states that successful growers apply stable manure to the poorer portions of the field and that a large part of the farmers apply about 100 lbs. per acre of a 3:8:6 or a 2:7:4 fertilizer. A rotation recommended for trial is first year, wheat; second and third years, clover and grass; fourth year, tobacco or corn; and fifth year, rye cover crop sown in tobacco or corn, and soy beans.

Contributions to the systematic classification of wheat varieties, J. Franz (*Beiträge zur Sortensystematik bei Weizen. Inaug. Diss., Univ. Giessen, 1911, pp. 82, pl. 1*).—The author made determinations of the number of kernels and their individual weight, and of the total weight of the kernels in each spikelet in 10 fully developed spikes of 17 varieties of wheat, and further ascertained the weight of the spike, the number of kernels, the total weight of the kernels, the average weight of the kernel, the number of rachis joints, and the spike length in 15 heads each of 15 varieties of wheat.

The data secured indicated that in general the second kernel in the spikelet is the heaviest, being followed in decreasing order by the first, third, fourth, etc. With reference to the weight of the spikelet, the head of wheat may be divided into 3 parts, the lower showing an increase in weight of spikelets from below upwards, the middle portion containing the heaviest spikelets, and the upper having a decreasing tendency in their weight as they are located nearer the point. The normal spike shows a uniformly full development in each part.

The following basis of classification is proposed: All varieties with rachis joints less than 0.4 cm. long are to be regarded as compact headed, those with the rachis joints from 0.400 to 0.499 cm. long as medium, and the varieties with the rachis joints 0.5 cm. long or longer as open-headed.

The rachis joints of the spikelets, as a rule, were found to increase in length up to the end joint, which is smaller than the joint preceding it. A study of the number and distribution of the fibrovascular bundles in the rachis did not disclose a relation to the distribution of the individual kernel weight in the spike.

Experiments with wheat varieties in the Cape Province, 1910, W. J. Lamont (*Agr. Jour. Union So. Africa, 2 (1911), No. 3, pp. 305–308*).—Notes on the rust resistance of numerous wheat varieties are followed by a table giving exact data on varieties tested in the Western Province during 1907–1910.

Some wheat tests, A. MacPherson (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 4, pp. 299–303, figs. 2*).—An application of 1 cwt. superphosphate was followed by a greater increase in the yield of wheat than resulted from the use of the same amount of fertilizer with sulphate of potash or nitrate of soda and gypsum, but in another test the greatest gain was obtained by the use of a mixture of 1 cwt. superphosphate, ¼ cwt. sulphate of potash, and ¼ cwt. gypsum. Results of variety tests are also reported.

Svalöfs solhvete (sun wheat), H. NILSSON-EHLE (*Sveriges Utsädesför. Tidskr., 21 (1911), No. 3, pp. 123–126, pl. 1*).—A new heavy-yielding winter wheat especially adapted to southern Sweden is described which at Svalöf produced 4,580 kg. of grain per hectare (68 bu. per acre), excelling in yield 5 other varieties tested. Similar variety tests at 4 other points are reported.

Rooibloem, H. H. W. PEARSON (*Agr. Jour. Union So. Africa, 2 (1911), No. 3, pp. 266–268*).—This is a preliminary report on an investigation of the life history of rooibloem or witchweed, in which the present knowledge of the economic and botanical characteristics of the weed is outlined. The experimental work undertaken includes the burial of seeds for the purpose of testing the conditions of germination.

HORTICULTURE.

A contribution to the study of the nutrition of cultivated mushrooms, A. HÉBERT and F. HEIM (*Ann. Sci. Agron., 3. ser., 6 (1911), II, No. 5, pp. 337–347*).—A previous study on the nutrition of the mushroom (*Agaricus campestris*) led the authors to conclude that both lime and potash fertilizers could be used with profit (E. S. R., 22, p. 339). A complementary study was made of the horse manures commonly employed in making mushroom beds to determine to what extent they supply nutrition to the mushroom.

It is concluded that the manures suitable for the culture of mushrooms are, as compared with fresh manures, poorer in ammonia, fats, and especially cellulose and xylan and richer in nitrogen and in vasculose. The mushrooms find in the manure in readily available form both nitrogenous matter and minerals in sufficient quantity with the exception of sulphuric acid and magnesia. For this reason it seems wise to add to the manure a small quantity of magnesia and sulphate fertilizers, such as kainit, which would likewise furnish a certain amount of potash.

Analyses were made of the manure in a mushroom bed at the beginning of the culture and at the end. Data are given which show the fertilizing elements lost in raising 1 kg. (2.2 lbs.) of mushrooms, for the growing of which it is concluded that 33 kg. of composted manure are necessary.

Pollination in orchards, F. J. CHITTENDEN (*Jour. Roy. Hort. Soc. [London], 73 (1911), No. 2, pp. 350–361*).—A brief review of previous experimental work in orchard pollination, including a discussion of the factors influencing pollination.

In connection with experiments being conducted at Wisley, a list is given showing the varieties of apples growing in the Wisley Garden, arranged in order according to the average date of full flowering for the 4 years over which observations have been made. Tabular data are also given in which the order of flowering of apples at Wisley is compared with that in other localities in England, in Victoria, and in the United States.

From the data secured at Wisley, it is concluded that although there will be in any one year some deviations from the relative order, these will usually be slight. A comparison of the blooming periods of the same varieties in different localities leads to the conclusion that a list drawn up from a sufficient number of observations in one locality will be in general a safe guide for planting in other localities.

Practical orcharding on rough lands, S. W. MOORE (*Akron, Ohio, 1911, pp. 289, figs. 80*).—This is a popular treatise on orcharding with special reference to apple growing on the rough hill and mountain lands in the East. Consideration is given to the questions of location, site, preparation of soil, selection of trees, choice of varieties, planting, care and cultivation, pruning,

spraying, picking, packing, and marketing. The subject matter is based in part on the author's experience in orcharding on rough lands.

Suggestions on the storage of apples, E. WALKER (*Arkansas Sta. Circ. 13, pp. 4*).—A popular presentation of the principles involved in keeping fruit and in the management of storage houses.

An index to illustrations of pears, E. A. BUNYARD (*Jour. Roy. Hort. Soc. [London], 37 (1911), No. 2, pp. 321–349*).—As with the index of apples previously noted (E. S. R., 26, p. 238), the present index comprises an alphabetical list of pears, with references to the illustrations appearing in publications of various countries.

The avocado in Hawaii, J. E. HIGGINS, C. J. HUNN, and V. S. HOLT (*Hawaii Sta. Bul. 25, pp. 48, pls. 7, figs. 13*).—A popular treatise on the culture of the avocado in Hawaii dealing with its botany and history, natural requirements, cultural requirements, control of injurious insects and diseases, crop statistics, harvesting, and marketing. Information is also given relative to methods of breeding the avocado and its use as food, including methods of serving and preserving the fruit. The better known trade varieties, together with varieties under test on the mainland of the United States and varieties of special merit under test at the Hawaii Station, are described.

The subject matter is based largely on the results of investigations conducted at the station for the past 2 or 3 years.

On some natural citrus hybrids, L. SAVASTANO and A. PARROZZANI (*Reprint from Staz. Agrum. e Frutticol. [Acireale], 1 (1911), pp. 37–63, pl. 1*).—This comprises a study of several natural citrus hybrids with special reference to persistence of type. A number of hybrids, including a lemon×orange, lemon×lime, and an orange×lime, are described, and analyses are given of several samples showing their content in sugar and acid.

The sugar and acid content of the hybrid forms was found to be much more variable than that of the cultivated orange, lemon, and lime. It is concluded that the hybrid types are so inconstant as to be of little value as cultivated varieties.

A bibliography relating to citrus fruits is appended.

Mottled leaf not spread by budding, J. E. COIT (*Pacific Rural Press, 83 (1912), No. 2, p. 29, fig. 1*).—In a budding experiment, here briefly reported, the author found that selected bud wood from trees of the Eureka lemon and Valencia orange, which were badly mottled owing to partial chlorosis, did not transmit this mottling when budded on healthy sweet stocks. On the other hand, the bud wood was so diseased that only a small percentage of the buds grew. The author does not recommend the use of such bud wood for propagating citrus trees.

Pruning and training the grape, F. E. GLADWIN (*New York State Sta. Circ. 16, pp. 8, pls. 4*).—This circular comprises brief general considerations relative to pruning and training grapes, and describes the methods of training the vines according to the various systems in common use.

Enological studies.—The chemical composition of American grapes grown in Ohio, New York, and Virginia, W. B. ALWOOD (*U. S. Dept. Agr., Bur. Chem. Bul. 145, pp. 35*).—This summarizes the results of a 3-year investigation of the chemical composition of the principal commercial varieties of American grapes grown in the central and eastern sections of the country, including a number of varieties not generally cultivated. The samples grown in Ohio and New York were analyzed at Sandusky, Ohio. The tabular data for the 3 seasons, 1908 to 1910, show the name of variety and locality in which grown, number of samples and growers, the Brix reading, and the average, maximum, and minimum total

of solids, sugar-free solids, sugar as invert, and acid as tartaric. Similar data are given for a smaller number of Virginia Piedmont grapes, analyzed at Charlottesville, Va.

As is the case in every grape-growing country, it has been found by these investigations that the character of the grape varies from season to season and often in the same vineyard or locality during a given season. In addition to furnishing tentative conclusions respecting the general character of the fruit produced with special reference to the sugar and acid content, it is believed that the data in hand will render possible more detailed investigations of certain specific features, such as the variability in composition of the more important varieties under different conditions of soil, climate, and culture.

Fruit modeling, TRUELLE and P. MASSERON (*Bul. Soc. Nat. Agr. France, 71 (1911), No. 8, pp. 738–749*).—This comprises a historical sketch of fruit modeling, together with a description of the methods used by the junior author in making fruit models.

Grafting and propagating plants, W. H. ALDERMAN (*New York State Sta. Circ. 17, pp. 8, pls. 4*).—Popular directions are given for propagating plants by means of graftage, buddage, cuttage, and layerage.

FORESTRY.

New England trees in winter, A. F. BLAKESLEE and C. D. JARVIS (*Connecticut Storrs Sta. Bul. 69, pp. 305–576, pls. 111, figs. 8*).—This bulletin comprises a guide to the winter identification of trees, for the most part growing wild in New England but also including some of the more frequently cultivated trees which are of value either for forestry or for ornamental planting. A list of the more important books of value to the student of New England trees is included.

An analytical key to the genera and species precedes the descriptions. The order of arrangement of the species and the scientific names follow the usage of the seventh edition of Gray's Manual. The individual species are described relative to habit, bark, twig, leaf scar, leaves, buds, fruit, distinctive characteristics, distribution, and wood. The illustrations, which form an important feature of the work, include photographs of the whole tree in winter, the trunk, twigs, and fruit. Inasmuch as New England forms the meeting ground for many species of both the northern and southern floras, the descriptive text and illustrations are of value outside of the geographically restricted region described.

In connection with the height measurement of trees, a homemade modification of an expensive hypsometer is illustrated and described.

The American woods, exhibited by actual specimens and with copious explanatory text, XII, R. B. HOUGH (*Lowville, N. Y., 1911, pp. VII+64, wood sections 75*).—The present volume contains sets of wood sections of 25 additional species of the Atlantic and Central States, each set comprising a transverse, radial, and tangential section (E. S. R., 23, p. 736). The specimens are accompanied by a systematic description of each species represented, including its botany, physical properties, and the uses of the wood. An index to the whole series to date is also included.

Trees, forestry, and lumbering (*Brooklyn, N. Y., 1914, pp. 40*).—A list of books and of references to periodicals in the Brooklyn Public Library.

A confusion of technical terms in the study of wood structure, C. D. MELL (*Forestry Quart., 9 (1911), No. 4, pp. 574–576*).—The author presents a list of names used for the same elements and makes an appeal for the adoption of uniform terminology.

Canadian volume tables, E. WILSON (*Forestry Quart., 9 (1911), No. 4, pp. 589–594*).—Volume tables are given for white spruce, black spruce, balsam, and white pine. The tables are based on measurements made throughout the valley of the St. Maurice River, Quebec.

Strength values for structural timbers, M. CLINE (*U. S. Dept. Agr., Forest Serv. Circ. 189, pp. 8*).—This circular contains in condensed form the average structural values resulting from a large number of tests made by the Forest Service on the principal structural timbers of the United States. The tables given show the results of bending, compression, and shear tests on green material and on air-seasoned material.

A list is given of the Forest Service publications in which parts of the data have previously appeared.

The Yale transplanting board, J. W. TOUMEY (*Forestry Quart., 9 (1911), No. 4, pp. 539–543, pls. 2, figs. 3*).—A board for transplanting forest seedlings, which has been used for 4 seasons at the Yale Forest School and to a certain extent by various state foresters and by others in the eastern United States, is here illustrated and described. This implement is believed to be superior to others tested, both from the standpoints of rapidity and of uniform planting.

Variation in time of nutrient absorption among forest trees and its practical importance in fertilization and silviculture, E. RAMANN (*Ztschr. Forst u. Jagdw., 43 (1911), No. 10, pp. 747–757*).—In a previous investigation of Bauer, briefly noted (E. S. R., 25, p. 27), it was found that there was a variation in the time of absorption of the principal inorganic fertilizers by different species. With the data secured from this work as a basis, the author here presents tables showing the time of the year in which the principal fertilizer elements are absorbed by spruce, pine, larch, and fir seedlings. Similar data are also given for the nitrogen absorption by the beech and oak. The possible application of these data in the fertilization of forest trees and in the development of pure and mixed stands is discussed.

On some experiments with mountain pine, E. ZEDERBAUER (*Centbl. Gesam. Forstw., 37 (1911), No. 7, pp. 297–310*).—About 1885 a large number of trees of the French mountain pine (*Pinus uncinnata*) were planted experimentally in various situations and soils in the Austrian Alps. Tabular data secured in 1909 are given showing the growth behavior of these trees under different conditions, some of the trees having been started from seed and others from young plants. The most significant observation made was that the trees growing nearest to the region of natural distribution of this species made the best growth.

The experiments indicated that the mountain pine is worthy of cultivation within its region of natural occurrence.

Regeneration of spruce in high altitudes, A. SCHAEFFER (*Bul. Soc. Forest. Franche-Comté et Belfort, 11 (1911), No. 4, pp. 292–300*).—A discussion of the regeneration of spruce in the alpine regions in which consideration is given to climate, soil, stand, and method of treatment.

Results of rubber tapping at the experiment station, Peradeniya, during 1910–11, M. K. RAMBER and J. A. HOLMES (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 19, pp. 307–316*).—Comparative results secured from the use of different methods of trapping are given.

Rubber tapping experiments, A. E. COLLENS (*Ann. Rpt. Dept. Agr. Trinidad and Tobago, 1910–11, pp. 65–73*).—Experiments in tapping and coagulating the latex of various rubber trees, including *Hevea* spp., *Castilla elastica*, *Manihot glaziovii*, and others are reported. The author devised a simple method, herein described, of coagulating and smoking Castilla and other rubber which has produced some fine samples.

Notes on the tapping of Hevea rubber by the method of paring, R. H. LOCK (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 6 (1911), No. 2, pp. 17–30, pls. 2*).—This circular contains popular information relative to the use of paring systems for tapping Hevea rubber.

Experiments in tapping Hevea brasiliensis, R. H. LOCK (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 18, pp. 231–306, figs. 2*).—This comprises the results to date of experiments in tapping old Hevea trees at Henaratgoda since June, 1908.

Experimental tapping of an old Hevea tree at Henaratgoda, R. H. LOCK and M. K. BAMBER (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 20, pp. 317–328*).—The tree described is one of the original seedlings sent out from Kew in 1876 and is now in its thirty-fifth year. Between December 5, 1908, and January, 1911, the tree was tapped 600 times, the average interval between the successive tappings being 1.3 days.

The total yield of dry rubber for the whole period was 174 lbs., or nearly 7 lbs. per month. It was noticed that after the tree had been left untapped for 2 or more days the yield almost invariably rose. Each tapping consisted of a paring with the Bowman-Northway knife, followed by a single application of the sharp pointed pricker. Renewal of bark has been perfect over the whole area tapped.

Report on the chemical and physical properties of samples of Hevea rubber from Henaratgoda Gardens, R. H. LOCK and M. K. BAMBER (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 16, pp. 209–216, fig. 1*).—In connection with a study of the effect of different intervals between successive tappings in Para rubber (*Hevea brasiliensis*), samples of the rubber obtained were sent to England to be vulcanized and submitted to manufacturing tests. This circular reports on the analyses and tests and discusses the results obtained.

On the collection of latex from Manihot glaziovii, A. ZIMMERMANN (*Pflanzer, 7 (1911), No. 10, pp. 570–576*).—Some experiments conducted on various plantations in the districts of Tanga and Wilhelmstal, German East Africa, are reported.

Annual report of the director of forestry of the Philippine Islands for the fiscal year ended June 30, 1911, G. P. AHERN (*Ann. Rpt. Dir. Forestry P. I., 1911, pp. 42, pls. 5*).—This comprises a progress report on the work of the divisions of administration and investigation, including statistics relative to the certification of public lands, amounts of important timber species cut, revenues and expenditures, timber licenses in force, utilization of forest products, and exports and imports.

The public forests under the charge of the bureau cover 16,000,000 hectares (39,536,000 acres) of land and the value of forest products realized annually is approximately $2,500,000. During the year the total amount of registered private woodlands was increased to 229,622 hectares.

Progress report of the Forest Research Institute for 1910–11, L. MERCER (*Rpt. Forest Research Inst. [Dehra Dun], 1910–11, pp. 28*).—This comprises a progress report on the work of the various branches of the Forest Research Institute, including working plans and silviculture, forest botany, forest economy, forest chemistry, and forest zoology.

A list to date is given of all forest publications issued by the institute.

Forest products of Canada, 1910.—Pulpwood, H. R. MACMILLAN, B. ROBERTSON, and W. G. H. BOYCE (*Dept. Int. Canada, Forestry Branch Bul. 26, 1911, pp. 14, figs. 2*).—Statistical data are given for 1910 showing the quantity, value, and kinds of pulpwood consumed by the Canadian mills, including also the processes used. The amount exported is also indicated. Comparative data are given for 1909. The 51 mills reporting used 598,487 cords of wood in

1910, and 943,141 cords were exported in the raw state. Pulpwood was imported to Canada for the first time.

Forest products of Canada, 1910.—Tight and slack cooperage, H. R. MacMillan, B. Robertson, and G. Boyce (*Dept. Int. Canada, Forestry Branch Bul. 27, 1911, pp. 11*).—A statistical review for 1910 showing the production of cooperage stock in Canada by classes, quantity, value, and species.

DISEASES OF PLANTS.

The present organization of the service in different countries for the protection against plant diseases and injurious insects, J. M. Saulnier (*L'Organisation Actuelle du Service de Protection Contre les Maladies des Plantes et les Insectes Nuisibles dans les Divers Pays. Rome: Internat. Inst. Agr., 1911, pp. XVI+223*).—This consists of a compilation of the regulations in Germany, Belgium, Bulgaria, Chile, Denmark, Spain, France, Tunis, Great Britain and Ireland, Australia, Canada, India, Mauritius, Italy, Luxemburg, Mexico, Holland, Roumania, Russia, Sweden, Switzerland, and Uruguay. The institutions and establishments concerned in the study of plant diseases, injurious insects, and means for their control are described, together with the personnel of the different services, the methods by which their investigations are brought to the attention of the public, the financial budgets of the different institutions, and the legislative and administrative measures which have been put into effect in the different countries regarding plant diseases and injurious insects.

California plant diseases, R. E. Smith and Elizabeth H. Smith (*California Sta. Bul. 218, pp. 1039–1193, figs. 102*).—This publication is intended as a handbook of plant diseases occurring in California, giving a brief description of the nature of the principal troubles, together with directions for their control. Many miscellaneous and less important troubles are also described, the plan being to record all the plant diseases of any possible interest which have been observed in California by members of the department.

The authors give brief outlines of plant physiology, of beneficial or unfavorable soil, air, and climatic conditions, and of the general causes of disease. Brief directions are given for the examination of plants for indications of disease, and lists of physiological and specific plant diseases in California. Directions are given also for plant management and treatment, including formulas for the more common fungicides and directions for their use. A brief bibliography is appended.

Fungus diseases, J. R. Bovell (*Rpt. Local Dept. Agr. Barbados, 1910–11, pp. 45, 46*).—Brief accounts are given of some fungus diseases of sugar cane, cotton, mangoes, etc.

The root disease of sugar cane (*Marasmius sacchari*) is said to be the most prevalent and destructive of the diseases which have come to the notice of the author. The stem disease (*Colletotrichum falcatum*) is said to be particularly destructive to the Bourbon varieties of cane, on account of which their culture has had to be abandoned. The rind disease (*Trichosphæria sacchari*) the author believes is of relatively little importance, as the fungus is thought to be only a saprophyte. The presence of the leaf sheath disease (*Cercospora vaginæ*) and the eye spot disease (*Leptosphæria sacchari*) is briefly mentioned.

Of the cotton diseases, the mildew, round spot, anthracnose, and angular leaf spot are briefly described.

Plant diseases due to fungi, W. E. Collinge (*Rpt. Econ. Biol., 2 (1912), pp. 41–49*).—Brief descriptions are given of a number of diseases that have been under observation, together with suggestions for their prevention. Among

those noted are a stem disease of fruit trees (*Eutypella prunastri*), beech seedling mildew (*Phytophthora omnivora*), beet and mangel rot (*Sphærella tabifica*), apple tree canker (*Nectria ditissima*), currant leaf spot (*Septoria ribis*), root and stem rot of potatoes (*Rhizoctonia violacea*), potato leaf curl (*Macrosporium solani*), cucumber collar rot (*Hypochnus cucumeris*), cucumber leaf blotch (*Hormodendron hordei*), and gladiolus smut (*Urocystis gladioli*).

Diseases of agricultural crops during 1910, M. L. MORTENSEN, SOFIE ROSTRUP, and F. K. RAVN (*Tidsskr. Landbr. Planteavl, 18 (1911), No. 2, pp. 317–350*).—A general review of the principal plant diseases met with in Denmark during the year.

Some interesting plant diseases from Bulgaria, I, F. BUBÁK and P. KOSAROFF (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 16–22, pp. 495–502, pls. 2, figs. 3*).—The authors describe and name 5 new fungi, which are listed as follows:

Fusarium maydiperdum n. sp. saprophytic on ears of maize, to which it is very injurious; *Phyllosticta džumajensis* n. sp. and *Microdiplodia vitigena* n. sp. both on living leaves of *Vitis vinifera*, neither being very injurious; *Cicinnobolus abelmoschi* n. sp. on leaves of *Hibiscus esculentus;* and *Coniosporium gečevi* n. sp. saprophytic on ears of maize, which it blackens and otherwise damages. All were found near Rusčuk in northeastern Bulgaria.

Observations on Marasmius oreades and Clitocybe gigantea as parasitic fungi causing fairy rings, JESSIE S. BAYLISS (*Jour. Econ. Biol., 6 (1911), No. 4, pp. 111–132, pls. 3, figs. 7*).—A study has been made of the above species of fungi, which commonly cause fairy rings.

It was found that *M. oreades* lives parasitically on grass. It attacks young roots, killing them by means of some toxic secretion. The fungus at first exerts a stimulating influence, and the grass assumes a darker color owing to better nitrogenous nutrition. This is believed to be due to the proteolytic enzyms acting on the dead roots. There can always be distinguished a zone of dark green grass outside as well as inside the zone of dead grass. The infected soil was found very impervious to moisture, owing probably to the air which is entangled within the meshes of the mycelium. It is thought that the fungus secretes a substance toxic to itself so as not to be able to grow in the same soil 3 years in succession. During the second year the fungus dies and the grass gains the ascendency and flourishes owing to the increased nitrogenous material available. The secretion of this toxic substance is believed to account for the disappearance of rings between the places of intersection when fairy rings meet.

The conclusions for *C. gigantea* agree in general with those given above for *M. oreades*.

On the diseases of cereals caused by attacks of Fusarium, M. L. MORTENSEN (*Tidsskr. Landbr. Planteavl, 18 (1911), No. 2, pp. 177–276*).—A review of present knowledge of the subject, accompanied by a comprehensive bibliography. Danish experiments with the hot-water and copper-sulphate treatments are reported, showing that the former if sufficiently high temperatures were used and the latter when correctly made were effective remedies against attacks of *F. nivale*, while the Ceres treatment was very unsatisfactory.

Infection experiments with the grain rust occurring on Rhamnus, F. MÜHLETHALER (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 16–18, pp. 386–419, figs. 4; abs. in Ztschr. Landw. Versuchsw. Osterr., 14 (1911), No. 9, p. 1133; Riv. Patol. Veg., 5 (1911), No. 8, pp. 115, 116*).—The author reports infection experiments with æcidia from various species of Rhamnus on a number of species of grasses. He demonstrated that *Puccinia coronata* which occurs on *Phalaris arundinacea* in central Europe forms it æcidia on *R. frangula*, *R.*

purshiana, and *R. californica*, and that its uredo form is also probably found on Calamagrostis and Glyceria. The æcidia from *R. cathartica* produce 3 forms of *Puccinia coronifera*, one occurring on *Bromus* spp., another on various species of Festuca, and the third on Lolium. The æcidia on *R. alpina* and *R. pumila* appear associated with the rust on *Calamagrostis* spp.

The paper concludes with a discussion of the specialization of different species of Puccinia on grasses.

On the intracarpellar prolification of Zea mays produced by smut infection (Ustilago maydis), II. ILTIS (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 119 (1910), I, No. 3–4, pp. 331–345, pls. 2*).—The author describes the abnormalities observed in the case of 2 ears of corn. These presented in place of grain a sac-like body from 10 to 20 cm. long with a thread-like prolongation from 1 to 20 cm. in length. This utricle contained as a prolongation of the axis an abnormal leafy shoot. He regards the whole structure as a result of infection by *U. maydis*, hyphæ of which were found in the cells of the utricle and the leaves of the enclosed shoot.

Mold on maize on the northern tablelands (*Agr. Gaz. N. S. Wales, 22 (1911), No. 12, p. 1046*).—A brief note is given on the occurrence of the mildew or dry rot fungus (*Diplodia zeæ*) on corn. The specimens examined were of the variety American Wonder, and it is stated that this variety is the one most subject to attack.

Rust in wheat and oats, R. W. PEACOCK (*Agr. Gaz. N. S. Wales, 22 (1911), No. 12, pp. 1013–1016*).—Attention is called to the varying resistance of different varieties of wheat and oats to rust in Australia, and it appears that the majority of bread wheats are liable to rust infection while the majority of macaroni wheats are practically resistant. Relatively more varieties of oats were found practically free from rust than of wheat.

The so-called dry spot disease of oats, HUDIG (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 27, pp. 380–382*).—This disease, formerly confined apparently to the bog lands of Holland, is now reported on sandy soils in parts of Holstein, possibly in connection with the excessive use of lime fertilizers.

The author gives results of his recent experiments with manganese sulphate, which gave considerable increases of yield in both grain and straw.

On the control of stinking smut (Tilletia fœtans) in winter wheat, K. STÖRMER (*Deut. Landw. Presse, 38 (1911), Nos. 80, pp. 917, 918; 81, p. 929*).—In continuation of work carried on since 1908 (E. S. R., 20, p. 1042; 22, p. 741; 23, p. 346) reports are made giving results and conclusions to date.

Dry heated air alone applied as a fungicide to wheat appeared wholly insufficient. Copper sulphate when used in a strength of 0.5 per cent or more for 16 hours gave good results. Formalin of from 0.1 to 0.25 per cent applied for from 15 to 30 minutes was effective in tests of both years, and is regarded as the surest of the means tested. Combination treatments are also recommended, and directions for them are given.

Notes on the club root of cruciferous plants, N. VAN POETEREN (*Tijdschr. Plantenziekten, 17 (1911), No. 4–6, pp. 150–164*).—Notes are given on observations regarding the club root of cruciferous plants, due to *Plasmodiophora brassicæ*, and the author describes some experiments with cauliflower to determine the effect of sterilizing the soil as well as cooking the infection material for periods of 15 and 30 minutes.

It was found that where the soil was sterilized and uncooked infection material supplied to the pots all the plants were affected, but sterilization of the soil accompanied by cooking even for the shortest period resulted in a clean growth.

The Corynespora leaf-spot disease of the cucumber, its dispersal and control, R. LAUBERT (*Deut. Landw. Presse, 38 (1911), No. 71, pp. 819, 820,*

figs. 2).—Leaves were examined containing specimens of a very injurious parasitic fungus confined, so far as known, to one locality in Germany. The organism is described, and stated to be *C. melonis*.

As protection against the spread of the infection it is suggested that seeds be carefully selected and steeped for 4 hours in a 0.5 per cent formalin solution, and that the plants be sprayed with the usual fungicides, all infected portions being removed and destroyed. Cultivation of resistant varieties is also recommended.

A serious lettuce disease (sclerotiniose) and a method of control, F. L. STEVENS and J. G. HALL (*North Carolina Sta. Tech. Bul. 8, pp. 89–143, figs. 31*).—This is a technical bulletin giving the results of an investigation on a disease of lettuce caused by *Sclerotinia libertiana*, some of the popular features of which have been described elsewhere (E. S. R., 25, pp. 548, 846).

After giving an account of the symptoms and the history of the disease, the morphology, systematic relationship, and physiology of the fungus are described at length. The ascospores and mycelium of the fungus are short-lived, the sclerotia being the resting stage. The authors claim that the ascospores can not directly infect healthy lettuce leaves, but must first sustain a period of saprophytic existence until the mycelium developing from the spores attains a certain degree of vigor. This can be done on any decaying organic matter, and if the saprophytic existence is near a lettuce leaf the vigorous mycelium rapidly passes over and parasitizes it. Infection from plant to plant is governed by the same conditions. If infected plants are within a few centimeters of sound ones the mycelium can cover that distance.

On account of the fact that some species of Sclerotinia are associated with Botrytis, a study was made of this fungus, and the authors believe that there is no evidence to warrant the conclusion that there is any phylogenetic relation between them.

A bibliography is appended.

A new pepper disease, H. N. RIDLEY (*Agr. Bul. Straits and Fed. Malay States, 10 (1911), No. 10, pp. 320, 321*).—A description is given of a disease of pepper due to *Colletotrichum necator*. This disease is recognized by the blackening and withering of the fruits, and may be checked by the picking and burning of all infected spikes.

The pepper, according to the author, is usually cultivated from cuttings, and after many generations becomes so weakened as to be particularly liable to attacks of fungi of various kinds.

A new disease of the potato, L. TRABUT (*Bul. Agr. Algérie et Tunisie, 17 (1911), No. 17, pp. 429–436, figs. 3*).—A description is given of the wart disease of potatoes due to *Chrysophlyctis endobiotica*, and the distribution of the trouble is indicated. The author calls attention to its seriousness and gives the text of various governmental proclamations and decrees regarding the importation of infected potatoes. A bibliography of the literature relating to this disease is appended.

On the cause of canker on fruit and foliage trees, J. WEESE (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 6, pp. 872–885, pl. 1*).—This is a report of a study of the fungus found associated with cankers and galls on twigs of fruit trees, willows, etc.

The author is of the opinion that *Nectria galligena* is responsible for the abnormalities hitherto attributed to *N. ditissima*, the confusion being due to imperfect description of the species. A technical description of *N. galligena* is given.

Silver-leaf disease, F. T. BROOKS (*Jour. Agr. Sci., 4 (1911), No. 2, pp. 133–144*).—In continuation of a brief account previously noted (E. S. R., 26,

p. 244), the author gives a detailed account of investigations conducted to determine the cause of the silver-leaf disease of plums and other fruit trees. His investigations, in which inoculations were made with portions of sporophores, mycelium, and spores of *Stereum purpureum*, seem to indicate that this fungus is the active agent which causes silver-leaf disease in England.

A study of the diseases of apples and pears, E. GRIFFON and A. MAUBLANC (*Ann. Inst. Nat. Agron., 2. ser., 10 (1911), No. 1, pp. 69–105, figs. 13*).—The results of a study of diseases of apples and pears when gathered, in transit, and in storage are given. A number of diseases due to physiological causes are described, such as the formation of stone cells in pears, water core of apples, and various kinds of spotting that are not due to fungi. Among the troubles that are attributed to parasites are rots caused by several molds, brown rot, scab, and bitter rot. In addition notes are given on rots caused by *Trichoscptoria fructigena* on apples, and *Discocolla pirina*, *Lasiostroma pirorum*, *Aposphæria pomi*, and *Phoma umbilicaris* on pears, the last-named being described as a new species which attacks pears about the calyx while they are still attached to the tree.

Leaf scald or fruit spot, D. MCALPINE (*Jour. Dept. Agr. Victoria, 9 (1911), No. 8, pp. 512–515, pl. 1, figs. 2*).—A description is given of the disease caused by *Entomosporium maculatum*, which has only recently been found occurring on pear trees in Australia.

A disease of the cultivated fig, F. A. WOLF (*Ann. Mycol., 9 (1911), No. 6, pp. 622–624, fig. 1*).—The author's attention was called in 1910 to a decay of figs, and an examination of the fruits showed the mycelium of a fungus. This was transferred and grown on various media, and soon pycnidia were produced which were found to contain the spores of a species of Macrophoma.

The author has compared his fungus with the known species of the genus occurring on figs, and concludes that it closely resembles *M. fici*. This species, however, has been previously reported as parasitic on the trees, and there seems to be no record of its occurrence in America nor of its presence on the fruit. The disease has been observed only on the purple varieties of figs; hence its early appearance is difficult to recognize.

Studies were made to determine how the fungus passed from one crop of fruit to the other, and there were found black pycnidia in the dead bark of branches which were identified by cultures and inoculations as associated with the disease.

In addition to the Macrophoma there were found on twigs a species of Pleospora and also one of Phoma, but attempts to connect these with *M. fici* by means of cultures indicate that they are not related.

The author concludes that the fungus is evidently parasitic on the twigs and larger branches and hibernates within the bark, and that if these be cut off early in the season little or no infection need be expected.

Stem-end rot of citrus fruits (Phomopsis sp.), H. S. FAWCETT (*Florida Sta. Bul. 107, pp. 23, figs. 9*).—Stem-end rot of citrus plants is a fungus disease appearing usually in August, causing fruits to drop or to soften at the stem end and decay, killing back the twigs and readily attacking wounded branches. Its progress is favored by the presence of scale insects on the fruits, and by warmth, shade, and dampness. The fungus (*Phomopsis* sp.) lives on dead branches and bark, on the mummified fruit, and in the soil under infected trees. Sound fruit can be infected, whether green or mature.

Experiments with fungicides have not proved effective in the prevention of this disease. The remedial measures recommended are the destruction of all infected branches and fruit, culling and careful handling, cooling shipped fruit in transit, and spraying against scale insects.

The "brusca" of coffee, R. AVERNA-SACCÀ (*Bol. Agr. [São Paulo], 12. ser., 1911, No. 8, pp. 527–609, figs. 10*).—The author describes a disease of coffee and claims that the same trouble occurs on olives, cacao, almonds, and other plants. He is convinced that the trouble, which is characterized by the drying and browning of the leaves, defoliation of twigs, etc., is due to constitutional disturbances resulting from too high or too low temperatures during the growing period of the plant. If the changes are sudden and of short duration the partial drying of the leaves is caused, but if more frequent and prolonged complete desiccation follows. In the leaves and in lesions on the branches various fungi are found, but none of them is believed to be primarily connected with the cause of the disease.

A bibliography is appended to the article.

A new Nectria and its Fusarium generation appearing on diseased roots of raspberry, A. OSTERWALDER (*Ber. Deut. Bot. Gesell., 29 (1911), No. 9, pp. 611–622, pl. 1*).—A disease on roots of *Rubus idæus* which impeded growth of the fruiting twigs was investigated and found to be due to a fungus. This was studied through its conidia-bearing stage and found to be a new species of Nectria, to which the name *N. rubi* was given.

The infection of the grape with downy mildew (Plasmopara (Peronospora) viticola), and protection therefrom, H. MÜLLER-THURGAU (*Weinbau u. Weinhandel, 29 (1911), Nos. 29, pp. 346, 347; 46, pp. 521, 522*).—In continuation of previous investigations the author varied and extended his former experiments with results confirming those already reported (E. S. R., 25, p. 352). He also sought to ascertain whether Bordeaux mixture applied to the under side of the grape leaves as recommended is likely to affect the rate of starch formation or transformation.

The results obtained did not indicate any marked effect upon either process. His conclusions up to the present may be summarized as follows: Spraying the upper side of leaves of cultivated grapes for downy mildew is effective only as the lower side happens to be reached thereby. Spraying the under side, if thorough, gives complete protection. Fungicides are less easily washed from the under side of the leaves by rains than from the upper side. Very small drops, if close together, are sufficient to prevent infection of the leaves. Suitably constructed nozzles with higher pressure will probably permit this new method of spraying to be used effectively and economically. The normal functioning of the leaf appears not to be materially affected by the method of spraying recommended.

Some diseases in orchids, P. SORAUER (*Ztschr. Pflanzenkrank., 21 (1911), No. 7, pp. 387–395, figs. 3*).—Four diseases are described affecting respectively *Cœlogyne cristata*, *Cattleya mendelii*, *Cypripedium lævigatum*, and Lælia. In causal relation with the first 2 the author describes a fungus which is held to be *Glœosporium affine*.

Rose mildew, J. B. S. NORTON and T. H. WHITE (*Maryland Sta. Bul. 156, pp. 73–80, figs. 6*).—Powdery mildew of roses, which has been attributed in this country to *Sphærotheca pannosa* and *S. humuli*, was found to be favored in greenhouses by drafts of cool dry air coming in at ventilators, crevices, broken glass, etc., which currents also distribute the spores capable of reproducing the disease in 6 or 8 days.

Low side ventilation retards the appearance and progress of the mildew, but this is often not considered practicable in a range of houses. Burning sulphur injured the leaves and did not seem to check the disease. Vaporizing sulphur without ignition, as by painting it on the heating pipes or warming it over lamps, is usually effective in controlling the fungus. A very heavy vapor, such

as results from boiling, injured the opening flowers without affecting the foliage.

Two new bacterial enlargements on the leaves of certain Rubiaceæ, F. BOAS (*Ber. Deut. Bot. Gesell., 29 (1911), No. 7, pp. 416–418, figs. 2*).—The author describes enlargements on the leaves of *Psychotria alsophila* and *P. umbellata*, which are due to the presence of bacteria. These growths, however, he claims are not pathological or in the nature of bacterial galls but are more or less connected with the life history and functions of the leaves.

Oak mildew, E. CUIF (*Bul. Soc. Sci. Nancy, 3. ser., 12 (1911), No. 1, pp. 102–105, fig. 1*).—A report is given of experiments carried on in 1909 and 1910 to prevent the mildew of oaks in nurseries by the application of sulphur. Seedlings dusted 2 or 3 times during the season were practically free from the fungus and attained an average height from 15 to 25 cm. above that of untreated trees.

Lophodermium macrosporum on the spruce, E. MER (*Bul. Soc. Bot. France, 57 (1910), Sess. Extraord., No. 1, pp. XLI–LI*).—The author recognizes two forms of a disease caused by *L. macrosporum* occurring on needles of the spruce, the first of which is characterized by a rapid discoloration early in the spring, and the presence of a great abundance of starch grains in the leaves, followed by the maturing of the fungus during the third year if the infection is produced before the end of summer. The spores are usually distributed from May to August.

In the second form of the disease the discoloration of the needles takes place very slowly, requiring 5 or 6 months, or, under certain conditions, 2 or 3 years. The maturity of the fungus is effected during the summer of the second year, and the spores are disseminated in the beginning of autumn of the second year.

The die-back disease and a note on the leaf diseases of Para rubber, K. BANCROFT (*Dept. Agr. Fed. Malay States Bul. 14, 1911, pp. 23, figs. 7*).—An account is given of the die-back of Hevea due to Diplodia, a stage in the fungus *Thyridaria tarda*, in which the occurrence of the fungus, symptoms and spread of the disease, and preventive and curative measures are given in some detail. A technical account has been noted elsewhere (E. S. R., 25, p. 753).

A brief summary is also given of the leaf diseases which have been described on Para rubber from different parts of the world, with suggestions for their control. In the Malay States the leaf fungi are most commonly met with in nurseries and it is stated that they can be readily controlled by the application of lime-sulphur mixture.

Additional data on the artificial medication of trees, S. A. MOKRZHETSKĬĬ (*Dnevn. XII, S"ĕzda Russ. Est.-Isp. i Vrach [Moscow], p. 527; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, pp. 608, 609*).—Recent experiments of the author corroborate the applicability of nutrition outside the roots for protecting trees from some diseases, such as chlorosis, Phyllosticta, Septoria, etc. (E. S. R., 16, p. 982).

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A list of the birds of the island of St. Lucia, A. H. CLARK (*West Indian Bul., 11 (1911), No. 3, pp. 182–193*).—Sixty-one forms are recorded from the island of St. Lucia, together with a list of birds undoubtedly occurring on the island but which have not yet been actually taken there. The protection of native birds in St. Lucia is discussed at some length, and a note given on the introduction of birds.

The injurious birds of France, E. D'ARENBERG (*Les Oiseaux Nuisibles de France. Orleans, 1911, vol. 1, pp. 109, pls. 21*).—This first volume deals with vultures, eagles, hawks, and owls.

Crows and the damage they cause in Denmark, J. E. V. BOAS (*Tidsskr. Landbr. Planteavl, 18 (1911), No. 1, pp. 109–137, pl. 1*).—This is an investigation of the character and extent of the damage done by crows in Denmark. The author finds that they are unquestionably the source of enormous damage to agriculture, while the good they do is insignificant. Remedial measures and legislation against crows are briefly considered.

The physiological effects of low temperatures, PICTET (*Abs. in Sci. Amer. Sup., 72 (1911), No. 1878, p. 423*).—The author has found that the eggs of the silkworm can be cooled to —40° C. without affecting their viability. The eggs of birds were killed at a temperature of —2 to —3°.

Report of the entomologist of the Arizona Horticultural Commission, A. W. MORRILL (*Ariz. Hort. Com. Ann. Rpt., 3 (1911), pp. 11–33, figs. 13*).—This report for the year ended June 28, 1911, is divided into 2 parts, part 1 consisting of a review of the activities in insect control, etc., and part 2 dealing with insects notably injurious.

Among the pests that were of special importance during the year were a species of Harrisina and a leaf hopper (*Dicraneura cockerelli*), which attacked the grape; *Euthrips tritici*, which killed many young peach and plum trees, seriously damaged others, and almost entirely destroyed the blooms of later varieties of peaches, plums, and apricots in many orchards in the Salt River Valley and also injured alfalfa; a rose beetle (*Macrodactylus uniformis*), which attacked fruit and vegetable crops: the melon capsid (*Pycnoderes quadrimaculatus*), which seriously injuried melons and late squashes; a lace bug (*Corythuca* sp.), which injured vegetables at Yuma; the beet leaf hopper; the variegated cutworm (*Peridroma margaritosa saucia*), which injured alfalfa; the clover seed chalcis fly, which injured clover and alfalfa seed; and the eastern peach tree borer, which was found to infest shipments of nursery stock; etc.

In remedial experiments conducted it was found that the flower thrips could be controlled by the use of lime-sulphur or a nicotin solution.

Agricultural defense (*An. Soc. Rural Argentina, Agr. and Live Stock, 1910, pp. 153–160, figs. 2*).—This is an account of the work being carried on in Argentina by the Institution of Agricultural Defense, which was originally organized in 1897–98 as a commission for the extinction of the locust. An account is given of the work conducted with the migratory locust, the West Indian peach scale (*Aulacaspis* [*Diaspis*] *pentagona*), leaf-cutting ants (*Atta* spp.), etc.

Second report on economic biology, W. E. COLLINGE (*Rpt. Econ. Biol., 2 (1912), pp. VII+70, figs. 15*).—The more important pests of the year are briefly considered under the headings of animals injurious to farm and garden produce, fruit trees, and forest and ornamental trees, plant diseases due to fungi, animal parasites and diseases, etc.

Studies on the life history of the mangel or beet fly (*Pegomyia betæ*), of *Cionus scrophulariæ*, a new pest of mangels and beets, and of the locomotion and length of life of the young of *Pulvinaria vitis ribesiæ* are included in the report. On smooth white paper or glass *P. vitis ribesiæ* traveled nearly 8 ft. in a period of 2 hours in a temperature between 78° and 84° F. On a teak boarded surface in the same length of time, at a slightly higher temperature, the rate of progress was just over 4 ft. in 2 hours. The larvæ continued to live in a temperature of up to 105°, but higher than that the rate of mortality was great. Three larvæ lived in a temperature of 105°, without any food, for a period of 20 days.

Insects injurious to stored grains, seeds, etc., with special reference to their occurrence in Egypt, F. C. WILLCOCKS (*Yearbook Khediv. Agr. Soc. Cairo, 1909, pp. 195–227, pl. 1*).—This is a discussion of the granary and rice weevil and the Angoumois grain moth, their injury to grain in Egypt, and remedial measures. A list of other grain feeding insects known to occur in Egypt, with notes on their life histories and economic importance, is appended. The species thus noted are flour beetles (*Tribolium confusum* and *T. ferrugineum*), the grain beetle (*Rhizopertha pusilla*), the drug store beetle (*Sitodrepa panicea*), the cigarette beetle, the cadelle, the saw-toothed grain beetle (*Silvanus surinamensis*), the corn cucujus (*Cucujus* sp.), Indian meal moth, and meal moth (*Pyralis farinalis*).

Tobacco insects of Tennessee, A. C. MORGAN (*Tennessee Sta. Bul. 93, pp. 101–113, figs. 8*).—While much of the data presented in this paper have been noted from other sources (E. S. R., 23, p. 465), it is in part supplementary. The tobacco flea beetle (*Epitrix parvula*), cutworms, and hornworm (*Phlegethontius sexta*) are the pests dealt with.

While it has been a commonly accepted belief that the abundant occurrence of hornworms in late July and August is due to a second generation, the author states that such is not the case. In 1909 but 11 per cent of the hibernating pupæ had emerged by July 10 and in 1910 only 3 per cent had emerged prior to this date. It has been found that 50 per cent of the emergence in 1909 took place between the dates of July 29 and August 9, and that in 1910 52 per cent of the total emergence occurred between the dates of July 30 and August 12. "Experiments carried on at Clarksville, Tenn., for 2 seasons showed that of the 5,000 tobacco worms placed in hibernation under natural conditions in 1908, only 32.4 per cent emerged the following season. In the hibernation experiments in 1909 over 3,000 larvæ were used. Of these only 16.4 per cent emerged in 1910. The smaller percentage of emergence in 1910 is undoubtedly due to the exceptionally severe winter of 1909–10." In experiments in 1908 in which hornworm pupæ were placed in cages in September, it was found that under normal conditions 78 per cent died during hibernation, whereas in cages in which the soil was plowed in November 98.6 per cent died. In 1910 the mortality in the plowed cage reached 100 per cent. The experiments conducted show that disking does not increase the mortality of the hibernating form to anything like the extent that plowing does, since survival from the disked cages was 9.3 per cent.

The author has found that powdered arsenate of lead, when specially prepared for use upon tobacco, can be applied in place of Paris green with no injury to the plant. By using this form of arsenic the injury to tobacco that frequently results in rainy weather from the washing of Paris green into the axils of the leaves and into the wounds made by the breaking out of the suckers, or by collecting along the midribs of the leaves, can be avoided. It is estimated that with 2 or 3 applications of Paris green practically all the hand picking can be dispensed with and at a cost not greater than $1 to $1.50 per acre. Experiments performed by the author in 1910 with arsenate of lead show that 4 or 5 lbs. per acre must be applied to give as good insecticidal results as can be obtained by an application of 1½ lbs. per acre of Paris green. He finds that Paris green in the dust form can not be applied as evenly or thoroughly when mixed with a carrier. A carrier is absolutely necessary when arsenate of lead is applied, and he advises that only freshly burned and therefore very dry, finely sifted wood ashes be used for this purpose. An absolutely even and thorough application must be made to insure success, and can not be made with lime as a carrier.

The insect enemies of the beet, F. PICARD (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 32, pp. 157–162, pl. 1*).—Brief accounts are given of the more important insects attacking the beet in France.

The cotton stainer bug, P. L. GUPPY and T. THORNTON (*Bd. Agr. Trinidad and Tobago Circ. 6, 1911, pp. 23, pl. 1, figs. 11; abs. in Agr. News [Barbados], 10 (1911), No. 251, p. 394, fig. 1*).—The cotton stainer bug (*Dysdercus howardi*) is the worst pest of cotton in Trinidad and Tobago, being found wherever gemauve (*Malachra capitata*) grows, and this appears to be all over Trinidad. In Tobago it is abundant on the leeward side of the island.

Studies of the life history and habits of the pest are reported, together with a discussion of control and remedial measures.

The chinch bug (Blissus leucopterus), H. A. GOSSARD (*Ohio Sta. Circ. 115, pp. 14, figs. 7*).—This circular gives a summary of the life history and habits of, and remedies for, the chinch bug. An extension of the territory infested by the chinch bug in Ohio took place during 1911, the damage caused amounting to a large sum. Should weather conditions during the fall and spring favor the increase of this pest, it seems probable that nearly the whole State will become infested and the loss be even greater than during the past 2 seasons.

Results of the artificial use of the white-fungus disease in Kansas, with notes on approved methods of fighting chinch bugs, F. H. BILLINGS and P. A. GLENN (*U. S. Dept. Agr., Bur. Ent. Bul. 107, pp. 58, pls. 5, figs. 4*).—The first part of this bulletin presents a historical summary of chinch bug diseases and the work with them prior to the inauguration of the investigations here reported.

There are 2 fungus diseases of the chinch bug, one due to the form known to science as *Empusa aphidis*, commonly known as the gray fungus; the other due to *Sporotrichum globuliferum*, and commonly known as the white fungus. The latter is the species with which the investigations here reported were conducted.

In the early investigations as to the natural distribution of the fungus 32 counties in the infested area of Kansas were definitely shown to contain the disease among the chinch bugs, and in observations made among chinch bugs in grain fields during April, May, and June, 1910, 27 additional counties were shown to contain it. The authors found that this fungus is not dependent either on dead organic matter or on living chinch bugs, but may live as a parasite on other insects, some of which are present in Kansas. These include 3 common snout beetles, *Trichobaris texana*, *Conotrachelus crinaceus*, and *Anthonomus fulvus;* a common flea beetle, *Disonycha triangularis;* a very common lady-beetle, *Hippodamia convergens;* a minute beetle of the genus Olibrus; 3 true bugs, one a rather rare insect belonging to the family Phymatidæ, the species undetermined, and the 2 common forms *Microtoma carbonaria* and *Coriscus ferus;* and 2 unidentified larvæ, and many common pentatomids.

During 1910 the authors sent out 1,363 packages of diseased chinch bugs with which to start infection boxes and artificially infect fields. The investigations inaugurated early in the year, continued until nearly the first of August, the purpose being to ascertain the practicability of artificial infection and so far as possible the best method of fighting chinch bugs in case it were proved that artificial infection with fungus is not effective. Nineteen experimental fields, distributed over 5 different sections of the State, with all sorts of conditions of humidity, rainfall, and character of soil, were treated with Sporotrichum spores.

"In some the artificial infection was confined to small plats of wheat 50 ft. square, with the expectation that the intensive infection would start an epidemic of the disease that would spread and kill a large proportion of the bugs. But no results were forthcoming, for not only did the plats fail to become

centers of contagion, but there was little or no appreciable difference between the treated and the untreated, or check plats, which were always used as a basis of comparison. General field infections were likewise always failures. . . . The evidence in every instance was overwhelming against the artificial use of fungus, as being without effect, and hence useless, since the fungus naturally found in the soil really accomplished whatever destruction of chinch bugs there was. . . .

"The fungus shows little tendency to spread from centers of artificial infection. The apparent rapid spread of the fungus is due to favorable conditions bringing it into activity simultaneously over considerable stretches of territory. . . . Spent adult chinch bugs succumb to attack more readily than younger ones, but as the old bugs have finished depositing their eggs, their loss by fungus disease accomplishes little else than increasing the amount of the infectious material. Laboratory experiments can be made to prove that artificial infection accomplishes results upon bugs confined in cramped quarters and without food, but in the field, where fresh and usually drier air prevails and food is abundant, an entirely different situation is presented."

Remedial measures are discussed under the headings of fall and summer treatment, the dust barrier, oil barriers, crude-oil-straw barrier, a barrier inclosing a field versus a barrier along one side only, and spraying with kerosene emulsion and crude oil.

A bibliography of 110 titles is appended.

The chinch-bug fungus, F. H. Billings and P. A. Glenn (*Univ. Press Bul. [Lawrence, Kans.], 1 (1910), No. 40, p. 1*).—This consists of a summary and the conclusions drawn from the investigations of the practicability of the use of the chinch-bug fungus, as reported in detail in the bulletin noted above.

The Psyllidæ of Japan, S. Kuwayama (*Trans. Sapporo Nat. Hist. Soc., 2 (1907–8), Nos. 1–2, pp. 149–189, pl. 1; 3 (1909–10), pp. 53–66, pl. 1*).—Fourteen genera of which 7 are new and some 90 species of which about one-half are new are characterized in this synopsis.

San José scale in the Transvaal (Aspidiotus perniciosus), C. B. Hardenberg (*Agr. Jour. Union So. Africa, 2 (1911), No. 3, pp. 256–265, figs. 3*).—A summarized account of the San José scale, its occurrence in the Transvaal, control and remedial measures, together with an appended note by C. P. Lounsbury.

Studies of comparative lepidopterology, C. Oberthür (*Etudes de Lépidoptérologie Comparée. Rennes, 1910, No. 4 bis, pp. 43, figs. 37; 1911, No. 5, pts. 1, pp. XXXVI+345, pls. 31; 2, pp. 136, pls. 75*).—A continuation of the volumes previously noted (E. S. R., 26, p. 348).

Native silkworms of Africa, E. Michel (*Bul. Agr. Congo Belge, 2 (1911), No. 2, pp. 310–322, pls. 3, figs. 3*).—A number of native silkworms of Africa of the genus Anaphe are here dealt with.

The Papilionidæ of Japan, S. Matsumura (*Trans. Sapporo Nat. Hist. Soc., 2 (1907–8), No. 1–2, pp. 67–78, pl. 1*).—Thirty species are recorded, of which 4 are described as new.

Cultural methods for controlling the cotton boll worm, C. K. McClelland and C. A. Sahr (*Hawaii Sta. Press Bul. 32, pp. 8, figs. 2*).—The small cotton boll worm (*Gelechia gossypiella*) is by far the worst pest of the cotton plant in Hawaii (E. S. R., 22, p. 59). In fields where this worm has been left undisturbed as high as from 60 to 75 per cent of the bolls have been infested. Sea Island cotton has been found to be more subject to its attack than Caravonica, and Egyptian somewhat less subject, while upland cotton is the least subject to their attack of all varieties.

Since it occurs in large numbers only upon cotton, it will be possible in a measure to control it by cultural methods, which include (1) annual pruning, (2) clean culture, and (3) trapping the mature moths. The plants should be severely pruned in the fall in as short a time as possible and all the branches and bolls immediately burned.

From experiments conducted in 1911, the authors conclude that fall pruning is imperative in order to allow proper development of the plants in the winter months when moisture is plentiful. "The increase in yield of fall pruned plants was nearly 46 per cent, the average yield per plant being 1.2 lbs. and 0.82 lb. of lint per tree for fall and spring prunings during the second year's growth of the plants." An improvised lantern trap recommended for use is illustrated and described.

Bag-shelter caterpillars of the family Liparidæ that are reputed to kill stock, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 22 (1911), No. 5, pp. 443–447, pls. 2*).—It is stated that when horses are fed on pastures which swarm with the slender hairy caterpillars of *Ocinara lewinæ*, the hairs coming in contact with the mucous membrane of the mouth cause an ulceration which sometimes even results fatally.

March flies, W. W. FROGGATT (*Dept. Agr. N. S. Wales Sci. Bul. 3, 1911, pp. 16, pl. 1*).—This is a brief account of the more important species of Tabanidæ, together with a list of 109 that have been recorded from Australia and Tasmania.

The dying of pine in the Southern States: Cause, extent, and remedy, A. D. HOPKINS (*U. S. Dept. Agr., Farmers' Bul. 476, pp. 15, figs. 4*).—This bulletin consists of a series of revised circular letters which were used in 1911 in an active campaign by the Bureau of Entomology of this Department through a forest-insect field station, located at Spartanburg, S. C., the purpose of which was to study the character and extent of the dying pine and to give instructions and demonstrations to the owners within the worst affected areas on the most economical and effectual means of control.

It is stated that in the areas designated as the shortleaf pine and loblolly pine belts, as well as in parts of the longleaf pine belt, the death of the pine has been caused by the southern pine beetle (*Dendroctonus frontalis*), while in Florida and certain other sections it is apparently due to a combination of other but similar bark-boring beetles. An account by the author of the life history and habits of *D. frontalis*, which was first described in 1868 from specimens collected in North and South Carolina, has been previously noted from another source (E. S. R., 22, p. 157.)

"Extended observations in all of the Southern States during the past 20 years led the writer to conclude that if all of the pine that has been killed during this time by this beetle was living to-day its stumpage value would amount to from $10,000,000 to $20,000,000 or more. . . . It is also evident that if active steps are not taken this winter by the principal owners in the infested areas this loss will be increased to another million dollars within the next year."

A description is given of the more important evidences of the presence and work of this beetle, directions for locating infested trees, together with the essential details in methods of control, and requirements for success. The method of control consists in locating the infested trees during November, December, January, February, and March and destroying the overwintering broods in the bark of the main trunks in the manner herein described in detail.

Practical information for beginners in bee keeping, W. NEWELL (*Texas Sta. Bul. 142, pp. 5–41, figs. 22*).—This revision of a bulletin on the subject

previously noted (E. S. R., 14, p. 890), gives information needed by those about to take up bee keeping.

Results of the cooperative experiments on the control of swarming, M. PETTIT (*Ann. Rpt. Ontario Agr. and Expt. Union, 32 (1910), pp. 48–53*).—A brief report of experiments.

A bee disease due to a protozoal parasite (Nosema apis), H. B. FANTHAM and ANNIE PORTER (*Proc. Zool. Soc. London, 1911, III, pp. 625, 626*).—The authors record the discovery of the occurrence of *N. apis* among bees in Cambridgeshire and Hertfordshire. Some of the infected combs were brown in color instead of the normal yellow, while the infected bees suffered from a sort of dry dysentery which rapidly proved fatal. Spores of *N. apis* fed in honey proved fatal to healthy hive-bees, mason-bees, and wasps, as did the placing of hive-bees dead of the disease among healthy hive and mason-bees and wasps, and the direct contamination of healthy bees with infected fecal matter. The virulence of the parasite appeared to vary in bees at different times of the year and in different localities. Bad seasons are usually followed by increase of disease. Some bees became chronics, forming reservoirs of spores and so acting as parasite-carriers. In the authors' opinion this parasite has been responsible for much of the bee disease recorded in England since 1906.

Other parasites found in bees, chiefly in the gut, include several species of gregarines, a flagellate apparently belonging to the genus Crithidia, a new amœba (*Entamœba apis*) very like *E. coli* of the human intestine, a spirochete, and various fungi.

Concerning the relation of food to reproductive activity and longevity in certain hymenopterous parasites, S. B. DOTEN (*Nevada Sta. Bul. 78, pp. 30, pls. 10*).—In this paper the author presents (1) an account of a method of feeding and confining certain small parasitic hymenopters and of observing copulation and oviposition in these species; (2) the manner of recording and grouping these observations; (3) methods of photographing some phases of the feeding and oviposition of these species, together with a series of photographs showing the oviposition and feeding in Pteromalus, Meraporus, and Microbracon.

The parasites under observation were kept in glass tubes 80 by 16 mm., rounded at one end, open at the other. To the open end similar tubes were attached with adhesive plaster. In the top arch of one tube there was placed a single small drop of honey water resting on the surface of a little patch of beeswax melted to the surface of the glass, the air in the tube being kept moist by a bit of blotting paper wet in distilled water. The tubes were all kept at a temperature between 70° and 75°; hence the observations recorded are valid only for those average temperatures. The photographs were made by flash light with explosive flash powder. This was put up in gelatine capsules for immediate use and exploded by electricity. The camera consisted of a wooden box screwed to the wall in an upright position and focusing was done by the light of a tungsten incandescent bulb.

Six species of parasites were studied. The first is an apparently undescribed native species of Meraporus that parasitizes the codling moth, as many as 16 having been bred from a single codling moth pupa. The codling moth caterpillars appear to die from the effects of ovipositor thrusts; such thrusts are never or at least very rarely accompanied by true oviposition. The author has observed nothing, however, which would go to prove that these thrusts were accompanied by the injection of such a poison as *Microbracon juglandis* injects when it stings the caterpillars of *Ephestia kuehniella*. *Picris rapæ* chrysalids punctured in this way invariably died later. "In not a single instance out of scores punctured by Meraporus females did maggots of Meraporus develop

within the chrysalids. This is the more astonishing from the fact that the female Meraporus certainly finds the fluid sucked from these chrysalids nutritious, and from the fact that such females lived for 2 weeks or longer on no other food. . . . Puncturing of Pieris chrysalids is plainly in response to an ovipositing impulse; for they will oviposit in smears of fluid from these chrysalids; or in drops of such fluid on cover glasses. The impulse to oviposition and the impulse to feeding are plainly closely allied; for the female will either oviposit in or feed on fluid from chrysalids." Both the male and female Meraporus, with or without oviposition or copulation, may easily be kept alive for 3 or more months if they are fed honey water, but they will not survive unfed for more than from 3 to 5 days at an average temperature of 70° F.

Three additional parasites of the codling moth, namely, *Aenoplex* sp., *Pimpla* sp., and *Tetrastichus* sp., were studied. Males and females of the species Tetrastichus lived for several days when kept at temperatures between 70° and 80° F. without access to food. Both males and females lived for several months when kept supplied with honey water.

The fifth species studied was *Pteromalus puparum*, a parasite of the cabbage worm (*Pieris rapæ*). Males of this species do not live much longer than 3 days unless fed, but when fed honey water they live for from 4 to 6 weeks. Unfed females will not survive over 4 days, but will live on the fluid from punctures in chrysalids for 1, 2, or even 3 weeks. "Females constantly fed on honey water and given opportunities for oviposition, may live for 2 months or more on the mixed diet so obtained. Two months from their date of emergence, after many ovipositions, they will still oviposit successfully. Females fed honey water, but given no chance to oviposit, may live for 2 months or even 3, probably even longer than those which have been fed honey water but given opportunities for oviposition. Oviposition is plainly an automatic reaction to an olfactory stimulus. The antennæ probably receive this stimulus, though the mouth parts may have a part in its reception."

The sixth species studied was *Microbracon juglandis*, a parasite of *Ephestia kuehniella*. "Males in copulation or not may be kept alive for an indefinite number of months at temperatures close to 70° F. if fed honey water. If not so fed, they die in a week or 10 days. Females live longer than males under these conditions. Females not fed at all die in from 11 to 15 days at the temperatures quoted. At freezing temperatures they will live without food for 4 months or more. When fed honey water they may live 3 or even 4 months in oviposition on caterpillars of *E. kuehniella*. When fed honey water and given no chance to oviposit, they will live for an undetermined number of months. The ovipositing female punctures the Ephestia caterpillar from time to time with the ovipositor, and feeds on fluids which she sucks from such punctures. Females will live for many weeks in oviposition on fluids sucked from caterpillars on which their own maggot-larvæ may be developing. A little group now under observation have lived thus for 75 days and are still alive and active."

Millipedes destroying vegetables, C. FRENCH (*Jour. Dept. Agr. Victoria, 9 (1911), No. 8, p. 549*).—The spraying of vegetable leaves with arsenate of lead and digging them into the soil, and the application of benzol emulsion to the soil are said to be of use in combating millipedes.

The cattle tick as affected by climate (*Tennessee Sta. Bul. 94, pp. 119–164, figs. 42*).—This bulletin consists of 2 parts.

Life history investigations, E. C. Cotton (pp. 119–131).—The life history investigations reported, extending over a period of 5 years under various conditions as to exposure, temperature, etc., at Knoxville, have proved that cold is the climatic factor which destroys the cattle tick. Thus whenever the tempera-

ture conditions, which have proved fatal in the Northern States, prevail over any portion of the territory now infested a large percentage of those not upon the host will be destroyed. When upon the host, however, the stages are not seriously affected by low temperatures, for the body heat of the host animal tends to offset the cold of the surrounding air. Twenty-four degrees F. was the highest temperature at which adult ticks were killed. At 17° all of 139 adult ticks exposed were killed, and at 16° and 15°, 91 and 92 per cent, respectively. All of the adult ticks exposed at 14° were killed as well as those at 13°, 12°, and 8°, thus the author assumes that 14° is fatal to all exposed adult ticks. It was found that ticks that have laid a part of their eggs are most easily killed by cold than those that have not commenced oviposition.

"Adult ticks proteced by a covering of chaff or fine litter, such as would be found about stables or barnyards, are able to endure much lower temperatures [12°] than those exposed to the air. If the cover be damp, however, they will be killed almost as readily as if unprotected. In barnyards the litter is very liable to be moist, if not wet, and as a consequence there is little danger of adult ticks in such situations surviving the winter. This is also true for ticks that drop from host animals on pastures and woodlands, for the leaves and other soil coverings are very liable to be excessively wet during the winter. In the stables, on the other hand, the litter or chaff is more than likely to be dry. . . .

"Ticks dropping from the host during the period when the daily mean temperature is between 75° and 69° lay eggs which may hatch the same season or may go over until the following spring, depending upon the temperature during the fall and winter months. Ticks dropping from the host after the temperature has fallen below 69° may lay eggs if not killed by freezing, but these eggs will remain dormant during the winter, hatching in the spring. In our investigations here we have found that engorged ticks dropping from the host animal during a short period in late fall have their egg laying interrupted several times by low temperatures and are finally killed by freezing before the process is completed. Those eggs which they do lay fail to hatch. Following this period is another during which all of the ticks are killed by freezing before egg laying has begun. This period is longest on the extreme northern edge of the tick area, becoming gradually shorter as one proceeds southward, until it disappears entirely under average conditions along the Gulf Coast."

The author has found that the water content makes up about 75 per cent of the weight of the normal egg. Experiments showed that when more than 25 per cent of the original weight of the eggs was lost they would not hatch. It was found that when unprotected by chaff, litter, or other mulches 78 per cent of the eggs were destroyed at 4° above zero and all are destroyed at 2° above. Forty-six per cent of the larvæ were killed at 8° above zero and all at 4° above.

Relation of climate to life history, J. F. Voorhees (pp. 132–164).—The author has made a study of the relation of temperature to the development and control of the cattle tick, using the data published by H. A. Morgan (E. S. R., 10, p. 389; 11, p. 588); Hunter and Hooker (E. S. R., 19, p. 664); Newell and Dougherty (E. S. R., 18, p. 987); and the author of the first part of this bulletin, on the life history of the tick; and the temperature records of the Weather Bureau of this Department, as a basis.

The methods followed are briefly described and illustrated. Charts have been platted which show the time necessary for the cleaning up of pastures by the starvation of seed ticks, beginning with the first of each month, and the average date when eggs laid the first of any month may be expected to hatch at various localities in the tick-infested area. Maps are also given which show

for each station the dates on which the mean temperature normally reaches 75° and 69°. Attention is called to the fact that the usefulness of the set of maps showing when seed ticks will have starved to death is not limited to the starvation method of eradication, since if the dipping method is used it is just as important to know when the fields will be cleared, for to dip too long causes unnecessary expense, while to stop dipping too soon is to throw away a whole season's work.

The cattle tick, H. A. REID (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 4, pp. 314, 315, figs. 2*).—The author records the occurrence of *Ixodes ricinus* in New Zealand for the first time.

New species of ticks (Hæmaphysalis, Amblyomma), L. E. ROBINSON (*Parasitology, 4 (1911), No. 4, pp. 478–484, figs. 4*).—Two species and 1 variety are described as new, namely, *H. silacea*, taken at East London, South Africa, from cattle allowed to run on a "starvation camp" from which stock had been excluded for 2 years; *A. fiebrigi*, collected at San Bernardino, Paraguay (host not specified); and *A. varicgatum nocens*, which has "become notorious among Rhodesian stock owners as the 'pyæma tick.' It is attributed to be the causative agent in the transmission of pyolymphangitis in equines; its bites are so severe as to cause violent inflammation and sloughing of the mammæ in cows. It also attacks the heads of native children, causing sloughing of portions of the scalp."

Some researches on the life cycle of spirochetes, H. B. FANTHAM (*Ann. Trop. Med. and Par., 5 (1911), No. 3, pp. 479–496, figs. 6*).—"The spirochetes considered in this paper are *Spirochæta duttoni*, *S. recurrentis*, and *S. marchouxi* (=*gallinarum*) among blood-inhabiting forms, also *S. balbianii* in *Ostrea edulis* and *Tapes aures*, *S. anodontæ* in *Anodonta cygnea* and *S. solenis* in Solenensis. Both living and stained material have been used. True longitudinal division, as well as transverse division has been observed in these spirochetes. There is a periodicity in the division of the blood-inhabiting spirochetes, transverse division occurring when the parasites are numerous in the blood, longitudinal division occurring at the beginning and end of infection. . . .

"Certain *S. duttoni*, when ingested by *Ornithodorus moubata*, and certain *S. gallinarum* ingested by *Argas persicus* pass through the intestinal wall of their hosts, and then form minute coccoid bodies, spores, or 'granules' by multiple transverse fission. Such granules, as well as spirochetes, may be found in the hæmocoelic fluid of the ticks, in the Malpighian tubules, and in the gonads. Some of the spirochetes and spores reach the ovaries and ova of the infected parent tick. The spores concentrate in the Malpighian tubules of the developing embryo, which may be born infected. Many nymphs of *O. moubata* born of infected parents are themselves capable of infecting. In the case of nymphs of *Argas persicus*, although various observers have recorded negative results, more experiments are necessary before it can be asserted that nymphs born of infected parents are themselves not infective. The main source of infection from both adult and young ticks is the white excrement passed from the Malpighian tubules. Elongation of the coccoid bodies, spores, or 'granules' to form short rods, and growth of these rods to form longer (or vibrio) forms has been observed in the tick. In this way young spirochetes are developed."

A bibliography of 26 titles is appended.

On the life cycle of Spirochæta gallinarum, E. HINDLE (*Parasitology, 4 (1911), No. 4, pp. 463–477, figs. 6*).—"The life cycle of *S. gallinarum* may be briefly summarized as follows: Commencing with the ordinary parasite in the blood of the fowl, the spirochete grows until it reaches a certain length (16μ–19μ) and then divides by the peculiar mode of transverse division described above. This process is repeated and is probably the only method of

multiplication of the parasite within the blood. When the spirochetes disappear from the circulation some of them break up into coccoid bodies which, however, do not usually redevelop in the fowl. When the spirochetes are ingested by *Argas persicus*, some of them pass through the gut wall into the coelomic fluid. From this medium they bore their way into the cells of the various organs of the tick and there break up into a number of coccoid bodies. These intracellular forms multiply by ordinary fission in the cells of the Malpighian tubules and gonads. Some of the coccoid bodies are formed in the lumen of the gut and Malpighian tubules. The result is that some of the coccoid bodies may be present in the Malpighian secretion and excrement of an infected tick and when mixed with the coxal fluid may gain entry into another fowl by the open wound caused by the tick's bite. They then elongate and re-develop into ordinary spirochetes in the blood of the fowl, and the cycle may be repeated."

Reports and papers on suspected cases of human plague in East Suffolk and on an epizootic of plague in rodents (*Ann. Rpt. Local Govt. Bd. [Gt. Brit.], 40 (1910–11), Sup., Rpt. Med. Officer, pp. 36–122, pls. 3*).—Three reports are here presented: (1) Report on Suspected Pneumonic and Bubonic Plague in East Suffolk and on the Prevalence of Plague in Rodents in Suffolk and Essex (pp. 36–75), by H. T. Bulstrode; (2) Observations on Rat Plague in East Suffolk (pp. 76–90), by C. J. Martin and S. Rowland; and (3) Report on the Pathological and Bacteriological Examination of Rodents (pp. 91–122), by G. F. Petrie and G. H. Macalister.

Further observations on a plague-like disease of rodents with a preliminary note on the causative agent, Bacterium tularense, G. W. McCoy and C. W. Chapin (*Jour. Infect. Diseases, 10 (1912), No. 1, pp. 61–72*).—In a paper previously noted (E. S. R., 25, p. 355) one of the authors described a disease found in nature in California ground squirrels (*Citellus beecheyi*), which is experimentally transmissible to other rodents and which in practically all susceptible animals gives rise to plague-like lesions. In the present paper the authors report certain observations based upon a larger experience with naturally infected ground squirrels and upon considerable experimental work, including the cultivation of the organism that causes the disease. An experiment is reported which proves conclusively that squirrel fleas (*Ceratophyllus acutus*) may at times transmit the infection from squirrel to squirrel.

FOODS—HUMAN NUTRITION.

[Food analyses and other pure food and drug topics], E. F. Ladd and Alma K. Johnson (*North Dakota Sta. Spec. Bul. 36, pp. 397–420*).—This bulletin discusses short-weight packages of lard, and other pure food topics; reports the examination of a number of samples of ice cream and miscellaneous food products, of drugs, and proprietary remedies; gives some data regarding the inspection of restaurants; and reports briefly studies by T. Sanderson which have to do with the milling and baking of wheat.

In a test undertaken to determine whether durum wheat can be sufficiently tempered, i. e., moistened, to make it mill as easily as other spring wheat without injuring its baking quality, the data obtained led to the conclusion that proper tempering improves very materially the flour produced and the condition of the wheat for milling, the durum flour milling very much the same as hard red spring wheat. A long tempering period was also markedly beneficial with respect to expansion and color in baking, especially with the patent and first clear grades. When kept 3 months in summer, to determine how aging

would affect the baking quality of the flour, it was found that in general some improvement in quality was noticeable.

Data regarding the relative milling and baking quality of winter and spring wheats grown in North Dakota and Montana indicate that the advantage from a baking standpoint is with the spring wheat, but, as it is pointed out, general conclusions can not be fairly drawn, since the data presented are insufficient for the purpose.

[Food analyses and other pure food and drug topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 37, pp. 421–436*).—Data are given regarding the examination of a number of miscellaneous food materials and of drug products and proprietary articles. Some dairy scores are also reported and a number of food and drug topics discussed.

[Food analyses and other pure food and drug topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul. 38, pp. 437–452*).—In addition to data regarding the examination of miscellaneous food products, a study of terpeneless lemon extract and a number of proprietary articles, and the examination of confectioners' establishments, the results of work with wheat and spelt are reported. Information is given regarding the moisture content of wheats grown in 1908 to 1911, inclusive, as well as a summary of data regarding the moisture content of hard red winter wheats grown in the same period.

In a test on the milling of spelt for bread making, the grain was handled in the same way as wheat, but owing to its brittle character there was an unusual loss due to the breaking of the kernels, which amounted to 12.7 per cent. The result of the milling test showed that spelt yielded 5 per cent of bran, 29.4 per cent of shorts, and 67 per cent of flour, an apparent gain in milling of 1.4 per cent. The grain contained 14.69 per cent of protein, and the flour 13.31 per cent. The flour was very dark in color, the straight grade being no better in this respect than ordinary low-grade wheat flour. However, it is pointed out that the products are entirely different and should no more be studied wholly on the standard of color than would be the case with corn meal. The absorption of water in making dough was about medium as compared with spring flours, and as to the strength of the gluten in relation to the contents of the loaf, spelt compared favorably with the soft winter wheat flours. "It is clearly evident . . . that this product is capable of being utilized as a food for man, and further experiments may give interesting results."

Influence of the method of cooking on the water content of food materials, H. LABBÉ (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1910, Sect. 1, pp. 254–260*).—This paper summarizes cooking tests made by the author in which the gain or loss in weight of various food materials cooked under special conditions was measured. Fresh and dried vegetables, cereals, fruits, and fish were used.

The change in weight varied from a loss of 52 per cent in the case of tomatoes to a gain of 634 per cent in the case of tapioca. In general, the author concluded that in certain vegetables, notably some which have naturally a high water content, the gain or loss of weight is slight, indicating that the osmotic exchanges are not active. The presence of salt in the water in which a vegetable food is cooked may have an important influence on the gain or loss. Those in which salt increases the loss of weight are more numerous than those in which it decreases it. All fruits lose weight in cooking, but less when sugar or salt is added to the water than when pure water is used. The tests with fish indicate that the loss of weight during brief cooking is slight, and is augumented by the use of salt. The loss was greater when the fish was fried.

These studies are to be continued.

The cooking and chemical composition of some English fish, KATHERINE I. WILLIAMS (*Chem. News, 104 (1911), No. 2715, p. 271*).—Continuing previous work (E. S. R., 19, p. 259), the author studied the composition of fish commonly eaten in England, with special reference to the loss of weight during cooking and the proportion of waste, and reports analyses of many samples of cooked fish.

The average loss of weight during cooking of 22 specimens was found to be 23.5 per cent. Table waste varied from 6.5 per cent in the case of salmon to 47.0 per cent in the case of gurnet. The waste or refuse was carefully weighed, "crushed with a pestle and mortar, boiled in distilled water, the filtrate siphoned off, and evaporated over a water bath until the weight of the residue was constant; this was weighed as gelatin." The phosphoric anhydrid and sulphuric anhydrid were calculated "for the materials in their natural moist condition as served at table." Tables of composition of the moist and water-free materials are also given.

The aging of flour and its effect on digestion, J. A. WESENER and G. L. TELLER (*Jour. Indus. and Engin. Chem., 3 (1911), No. 12, pp. 912–919*).—Artificial digestion experiments were conducted with cornstarch, with starch from flours bleached with nitrogen oxids, with breads from unbleached flour to which nitrogen oxids were added, with unbleached flour, and with fibrin combined with nitrite nitrogen. The conclusions reached were as follows:

"Nitrites do not interfere with diastase in its action on starch, even when present as sodium nitrite to the extent of 1 part in 1,000.

"Nitrous and nitric acid do not inhibit the action of peptic digestion, and may wholly replace hydrochloric acid in this essential first stage of digestion, while digestion by pepsin without acids will not take place.

"While pancreatic digestion will not take place in the presence of free acids, it is not inhibited by the presence of relatively large quantities of nitrites, nor is its action restrained on the proteid which has been previously subjected to appreciable quantities of nitrous and nitric acids.

"The nitrite-reacting material of flour, as far as we have been able to determine, is entirely due to the direct union of the coloring matter and the nitrogen oxid."

Concerning stringiness in bread, M. P. NEUMANN and O. KUISCHEWSKY (*Ztschr. Gesam. Getreidew., 3 (1911), Nos. 9, pp. 187–191; 10, pp. 215–220; 11, pp. 242–245*).—Experiments were made to determine the nature of the bacterial disease causing stringy or slimy bread—a disease occuring in bakeries in all parts of Germany, especially during periods of prolonged heat, and due to the potato bacillus. Its spores survive the heat of cooking and produce the slimy or stringy character in the crumb within 2 to 4 days after baking.

The authors made tests with different flours, yeasts, and leavens, on the influence of varying water content, the addition of rice and potato starch, storage conditions, etc., and reached the following conclusions: The bacillus is present in flours and meals of all grades and kinds, and the danger of infection can not be wholly avoided. Rice and potato starch are somewhat more favorable to its growth than wheat or rye flours. The acid present in breads made with leaven tends to check the growth of the bacilli and such breads are less likely to be affected than those raised by yeast. The spores develop best at a temperature of 40° C., so their growth can sometimes be checked by cooling the bread, therefore cool, airy storerooms are to be recommended. The water content of the bread also influences their virility, large, moist loaves proving more susceptible than dry and small ones. Storing the flour in cool, airy rooms is also believed to be beneficial.

Army bread, J. CHEVALIER and C. HEUDEBERT (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1910, Sect. 2, pp. 186–189*).—The difficulty of producing a satisfactory bread for armies in the field is discussed and a new type of bread is described.

Gluten bread—breads for special diets, J. CHEVALIER (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1910, Sect. 2, pp. 181–185*).—Analyses are reported of gluten bread and other special food preparations on sale in Paris. The ordinary baker's bread now produced in Paris the author considers less digestible because more quickly raised and less carefully baked than was formerly the case. He recommends that all labels be required to state the ingredients of the goods represented and that standards be set by which the therapeutic value of different sorts may be measured.

Soluble carbohydrate of chestnut flour, G. LEONCINI (*Staz. Sper. Agr. Ital., 44 (1911), No. 2, pp. 113–118; abs. in Chem. Zentbl., 1911, I, No. 26, p. 1873*).—Flour prepared from chestnuts was extracted with water and a little lead acetate, and the filtrate was polarized. About 26 per cent of surcose was found to be present. Erythro-, amylo-, and acro-dextrin were absent. It is suggested that possibly these may be formed when chestnuts are roasted at too high a temperature.

Volna, a meat substitute, KOCHS (*Pharm. Zentralhalle, 52 (1911), No. 50, p. 1344*).—An analysis with the calculated energy value of this German commercial meat substitute is reported and the cost of its nutrients per pound computed.

The presence of arsenic in food gelatin, O. KOPKE (*Arb. K. Gsndhtsamt., 38 (1911), No. 3, pp. 290–293*).—Twelve specimens of commercial gelatin intended for use as human food were tested for arsenic, the amounts found varying from minute traces to 0.3 mg. in 10 gm. of material. Since gelatin is frequently prepared from waste products of tanneries, leather factories, etc., the arsenic used in tanning or later in preserving leather may be the source of the arsenic in the gelatin. On the other hand, arsenic may not have been intentionally used with materials selected for gelatin making, but may have been unintentionally introduced with the reagents used, for many chemicals accidentally contain minute traces of arsenic. This may, for example, be the case when gelatin is made from bones. The protection of public health, the author believes, demands further investigation along these lines.

The composition of tincture of ginger, H. C. LYTHGOE and L. I. NURENBERG (*Jour. Indus. and Engin. Chem., 3 (1911), No. 12, pp. 910–912*).—Tinctures of ginger were prepared from powdered Jamaica, African, and Cochin ginger root, and from a sample of ginger oleoresin. Alcohols of strength varying from 95 to 30 per cent were used. Commercial tinctures of ginger were also analyzed.

It appeared that the amount of alcohol-soluble materials was the same when alcohols of any strength over 70 per cent were used; the amount extracted with weaker alcohols was less. Oleoresin required 95 per cent alcohol to produce a tincture of the same strength as tincture of ginger root made with 70 per cent alcohol.

Concerning the sale of food materials exposed in public streets, M. HONNORAT and E. KOHN-ABREST (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1910, Sect. 3, pp. 155–161*).—The authors cite various recent investigations into the dangers of bacterial contamination of foods exposed in streets or in unclean shops, or produced under insanitary conditions, and summarize the regulations recently adopted by the municipal and departmental authorities in Paris for the protection of the consumer, especially in the case of vegetables and fruits likely to be eaten raw.

The influence of environment on diet, Z. KOTCHETKOVA (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1910, Sect. 1, pp. 261–264*).—The author compares the results of dietary studies made in different urban and rural sections of Belgium and of others made in various countries, including the United States. He concludes that the environment is a controlling factor in the diet, and that on changing his environment, as when he emigrates, man rapidly adapts his diet to the conditions prevailing in his new home.

The management of children predisposed to nervousness, L. F. BARKER (*Bul. Med. and Chirurg. Facult. Md., 3 (1911), No. 9, pp. 113–121*).—This paper discusses the conditions which influence the nervous system of the child and makes practical suggestions regarding the mental, moral, and physical discipline to which children predisposed by inheritance or environment to nervousness should be submitted.

In regard to nutrition, the author says:

"Plenty of good simple food including milk, meat, vegetables, and fruit with avoidance of condiments, coffee, tea, and alcohol, is approved by all authorities.

"Many parents make the mistake of allowing the caprice of the child to influence its diet. We now know the foods that are suitable for children and, knowing these, the children should be provided with them in suitable amounts and should be required to eat of them, largely independent of choice. The child that learns to eat and digest all wholesome foods and who is not permitted to cultivate little food antipathies makes a good start and avoids one of the worst pitfalls of life with which medical men are very familiar, namely, a meticulous anxiety concerning the effects of various foods, all too likely to develop into a hypochondriacal state."

The work of the kidneys and the specific dynamic action of nutrients, F. TANGL (*Zentbl. Physiol., 25 (1911), No. 19, p. 889*).—Experiments were made with dogs on which tracheatomy was performed.

In 9 series of experiments it was demonstrated that the gaseous exchange decreased after the kidneys had been isolated. The absolute amount of this decrease seemed to bear no relation to body weight. The kidneys of a dog weighing 6 kg. were estimated to consume 4.4 cc. of oxygen per minute and produce 2.2 cc. of carbon dioxid, and their work demanded 7.9 per cent of the total energy transformations of the body.

The oxidation was increased by the introduction of albumin, as was also the energy transformation; uric acid and a solution of common salt produced the same effect. From this, the authors conclude that the specific dynamic action of albumin can not explain increased activity of the kidneys.

How far can protein catabolism in inanition be diminished by feeding on carbohydrates? W. WIMMER (*Ztschr. Biol., 57 (1911), No. 6–7, pp. 185–236, dgms. 3*).—In experiments with dogs, the authors found 55 per cent of the protein could be protected by feeding carbohydrates. The influence of gelatin as a protein sparer was less marked. When starch and dextrose were given at intervals throughout the day, their effects were about equal. Any pathological condition in the dogs seemed to affect the result of the experiments.

Secretion of gastric juice with decrease in the chlorin supply of the body, R. ROSEMANN (*Pflüger's Arch. Physiol., 142 (1911), No. 3–6, pp. 208–234*).—In experiments which were made with dogs fed on a diet poor in salts, no important decrease in the body supply of chlorin was noted, the organism protecting itself by decreasing the amount secreted by the kidneys. The removal of gastric juice by means of a fistula was more effective. A decrease in the chlorin supply was followed immediately by a decrease in the amount of acidity of the gastric juice and by loss of appetite.

The author concludes that needs for gastric secretion can be met by 20 per cent of the normal reserve of chlorin in the body. He suggests that the sensation of hunger may be influenced by the chlorin content of the cells of the stomach, and that pathological changes reducing the capacity for storing chlorin in these cells may explain certain cases of anorexia and subsequent under-nutrition. The gastric secretion is, however, dependent upon the general condition of the subject as well as upon the chlorin supply. Under-nutrition may impair gastric secretion even if the chlorin supply is unaffected, and hence highly restricted diets intended to induce gastric "rest" may defeat their own purpose.

Influence of certain accessory foodstuffs (tea, coffee, etc.) on gastric secretion, F. C. MOORE and H. E. ALLANSON (*Lancet [London], 1911, II, No. 23, pp. 1551, 1552*).—Using 15 subjects the author studied the comparative influence of water, tea, coffee, cocoa, milk, albumin water, meat extracts, and alcohol upon gastric digestion. Test breakfasts consisting of fixed amounts of breakfast biscuit and the particular beverage to be tested were given to fasting subjects. At the end of an hour the gastric contents were removed and tested for hydrochloric acid, total acidity, and peptic reaction.

Tea, a weak infusion of caffein, coffee, cocoa, and meat extract all increased the three factors noted, as compared with water. Milk decreased the hydrochloric acid and the peptic reaction, but increased the total acidity to a marked extent.

A comparative study of temperature fluctuations in different parts of the human body, F. G. BENEDICT and E. P. SLACK (*Carnegie Inst. Washington Pub. 155, 1911, pp. V+73, fig. 1*).—The purpose of the work here reported was to determine the accurate measurements of body temperature, "the temperature gradient of the body, and especially whether or not the temperature fluctuations occurring in the different parts of the body are uniform." Specially devised thermal-junction thermometers were used in 38 experiments with normal subjects, measurements being taken in the rectum and other parts of the body. The authors' general conclusions are expressed as follows:

"It can be stated that an examination of all the results obtained shows in the temperature curves a remarkable trend toward parallelism, a parallelism that would be exact, there is every reason to believe, if the thermometers could remain in precisely the same position and if the cavities could remain absolutely constant in their closure. We feel justified, therefore, in summing up this work by stating that, aside from the skin temperature, a rise or fall in rectal temperature is accompanied by a corresponding rise or fall in the temperature of all other parts of the body."

In addition, they observed that body temperature showed a tendency to drop during repose following slight muscular work and also after drinking cold water, while muscular exercise and drinking hot coffee raised it.

The chemistry and energy metabolism of sleeping children, J. HOWLAND (*Hoppe-Seyler's Ztschr. Physiol. Chem., 74 (1911), No. 1, pp. 1–12; Trans. Assoc. Amer. Physicians, 26 (1911), pp. 399–409; abs. in Proc. Soc. Expt. Biol. and Med., 8 (1911), No. 3, pp. 63, 64*).—Experiments were made with infants between 3 and 7 months old in a respiration calorimeter of the Atwater-Rosa-Benedict type. Food, excretory products, heat production, etc., were studied and the results obtained with healthy children compared with those from ill-nourished or feeble ones. It is only in the case of well-nourished children that the law holds that the heat produced is in proportion to the surface area of the body.

ANIMAL PRODUCTION.

Physiological effect on growth and reproduction of rations balanced from restricted sources, E. B. HART ET AL. (*Wisconsin Sta. Research Bul. 17, pp. 131–205, figs. 24*).—A preliminary report on the physiological value of rations for the cow, in which the feeds were limited to a single species of plant. One lot of animals was fed on corn meal, gluten feed, and corn stover; another lot on ground wheat, wheat gluten, and wheat straw; a third lot was given oat meal and oat straw; while the ration for the fourth group was a mixture of these rations.

Salt was given to the animals ad libitum, but only 29½ lbs. was used by the oat-fed animals the first year, while the mixture-fed lot consumed a total of 377 lbs. in the same period, the wheat-fed lot 143½ lbs., and the corn-fed lot 150½ lbs. After the first year there was a tendency toward a more uniform consumption of salt by all the lots, though 2 of the oat-fed heifers still continued to consume small quantities throughout the entire experimental period, which began May 31, 1907, and continued for 3 years.

As a result of these methods of feeding, the cows fed nutrients from the wheat plant lacked vigor, size, and strength of offspring, and capacity for milk secretion. Those receiving their nutrients from the corn plant were strong and vigorous, in splendid condition all the time, and produced young of great weight and vigor. The animals receiving nutrients from the oat-plant were able to perform all the physiological processes of growth, reproduction, and milk secretion with a certain degree of vigor, but not in the same degree as manifested by the corn-fed animals.

"Where a mixture of all the above plant materials was used the animals responded to the ration with less vigor than to the corn and oat ration alone, but with more vigor than to the wheat ration. . . . Monotony of diet was not a troublesome factor and is not of such importance in nutrition problems as usually supposed. . . . At present we have no solution for the observations made."

When the wheat-fed animals were changed to the corn ration a marked improvement resulted. The reverse was true when corn-fed animals were taken to the wheat ration. The urines from all animals on all rations were invariably acid to phenolphthalein. The urines of the wheat-fed animals were acid to litmus; those from the other lots were alkaline or neutral. Correction of this acid reaction by feeding alkaline carbonates did not restore the wheat-fed group to full vigor and proper condition. Allantoin was absent from the urines of this group during the period of growth; during gestation it was present. The degree of oxidation of sulphur in the urines of the several groups was not greatly different.

The composition and character of the milk fat was in most respects remarkably constant with the different rations. The only important variant was the high melting point of the fats on the oat ration. There was a decided consistency of the distribution of nitrogen in muscle and blood, and in the chemical and physical constants of the carcass fats.

The starch equivalents of feeding stuffs, W. GOODWIN (*Jour. Bd. Agr. [London], 18 (1911), No. 9, pp. 721–735*).—A discussion of Kellner's term "starch equivalent" and the method of using it in compounding rations for live stock.

Commercial feeding stuffs, J. W. CARSON and G. S. FRAPS (*Texas Sta. Bul. 141, pp. 3–97*).—A report of the feed control inspection, with analyses of cracked corn, corn chop, milo maize chop, Kafir corn chop, crushed Kafir corn

heads, ear corn chop, crushed shucked corn, hominy feed, corn bran, wheat bran, shorts, middlings, corn and cob meal, alfalfa meal, tankage, blood meal, meat meal, beef scrap, rice bran, rice polish, ground rice hulls, ground rough rice, cotton-seed meal, bean meal, corn meal, ground oats, cold pressed cotton-seed cake, peanut cake, cotton-seed hulls screenings, dried brewers' grain, ground barley, and mixed feeds.

Industrial by-products of feeding stuffs, L. WUYTS and F. COURTOY (*Jour. Soc. Agr. Brabant et Hainaut, 56 (1911), Nos. 7, pp. 84, 85; 8, pp. 99, 100; 9, pp. 113, 114*).—These articles discuss the feeding value of gluten meal, cotton-seed cake, peanut cake, dried yeast, sugar-beet pulp, molasses, and cacao shells.

Stack ensilage (*Queensland Agr. Jour., 27 (1911), No. 5, pp. 218, 219*).—Directions are given for making ensilage out of doors, thus dispensing with the cost of erecting a silo. This method seems to be popular in Australia, although there is always more or less loss of food material.

Feeding experiments with ground grapevine trimmings, O. VON CZADEK (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 9, pp. 1104–1122*).—Feeding tests with horses, cows, and draft oxen showed that the feeding value of trimmings from 1-year wood of grapevines was inferior in feeding value to that of straw. An analysis is given.

Further investigations on the digestibility of dried potatoes, F. HONCAMP, B. GSCHWENDNER, and D. ENGBERDING (*Jour. Landw., 58 (1910), No. 4, pp. 363–384*).—Dried potatoes in the form of flakes, chips, and pressed potatoes were fed to wethers in connection with clover hay and sesame cake. The average digestion coefficients of the potatoes were as follows: Pressed potatoes (papka), organic matter 87, nitrogen-free extract 95.6, and fiber 7.5 per cent; potato flakes, organic matter 89; protein 37.1, and nitrogen-free extract 94.6 per cent; potato chips, organic matter 87.1, protein 36.1, nitrogen-free extract 92.9, and fiber 48.7 per cent; a second brand of potato chips, organic matter 86.5, protein 44.2, nitrogen-free extract 95.4, and fiber 22.7 per cent; a third brand of potato chips, organic matter 87.7, protein 32.3, and nitrogen-free extract 96.3 per cent; and potato pulp, organic matter 81.6, nitrogen-free extract 90.4, and fiber 36.5 per cent.

Green color of rape-seed or colza cakes, L. BUSSARD (*Ann. Falsif., 4 (1911), No. 28, pp. 75–77; abs. in Analyst, 36 (1911), No. 425, p. 411*).—The author found that Indian rape-seed cake was frequently treated with from 0.75 to 1 per cent of sodium carbonate in order to simulate the green color of the European cake. The European colza is *Brassica oleracea*, but the Indian colza cake includes *B. juncea*, *Sinapis dichonita*, *S. glauca*, *Eruca sativa*, and other Cruciferæ.

Composition and feed value of rice by-products, J. E. HALLIGAN (*Amer. Hay, Flour, and Feed Jour., 20 (1912), No. 2, pp. 20–22*).—This contains statistics on the rice industry, a description of the processes of milling rice, analyses of rice and its products, a discussion of the feeding value, and sample rations for stock in which rice products are a prominent ingredient.

Report on cattle feeding experiments with soy-bean cake, W. BRUCE (*Edinb. and East of Scot. Col. Agr. Rpt. 25, 1911, pp. 16*).—Feeding tests similar to those previously reported (E. S. R., 24, p. 371) indicate that soy-bean cake, when used as a supplement to feeding stuffs in bullock fattening to the extent of from 4 to 5 lbs. daily, is a healthful cattle food and a satisfactory beef producer, but weight for weight is not equal to linseed cake.

On the feeding value of animal meals, E. PESCHECK (*Jour. Landw., 58 (1910), No. 4, pp. 345–362*).—Analyses of several brands of bone and meat meals are given, and metabolism experiments with dogs are reported. Although

they are highly digestible, it is pointed out that in the use of these meals there is a possibility of transmitting infectious diseases.

"Romauxankalk" in animal metabolism, O. HAGEMANN (*Pflüger's Arch. Physiol., 140 (1911), No. 1–4, pp. 158–164*).—Metabolism experiments with wethers showed that this proprietary compound of organic phosphorus is easily assimilated.

Karroo soil, lucern, and the ostrich feather, P. D. HAHN and D. S. STEVENSON (*So. African Jour. Sci., 7 (1911), No. 3, pp. 122–128*).—Analyses of lucern and karroo soil are reported. It is stated that in South Africa lucern removes more phosphorus, potash, and lime from the soil than in European countries. Analyses of ostrich feathers showed that those from ostriches fed on lucern contained less ash than feathers from the veld-fed and wild ostriches.

On the movement of feeding stuffs through the alimentary tract, particularly of swine, J. SCHNEIDERHEINZE (*Ueber die Aufenthalts- und Durchgangszeiten der Nahrung bez. ihrer Reste im Magendarmkanal, speziell im Magen des Schweines. Inaug. Diss., Univ. Bern, 1910, pp. 89, tables 6, figs. 24*).—After reviewing the literature on the subject, the author reports his own experiments with swine, in which dissimilar rations were given at the last feeding period before slaughtering. The exact location of the feed at successive intervals, the action of the different parts of the alimentary tract, the length of time required to reach the different portions, and other data are described in detail and presented in tabular form.

Investigations on the mechanism of rumination, C. FOÀ (*Pflüger's Arch. Physiol., 133 (1910), No. 4–6 pp. 171–200, figs. 16*).—The author has studied spontaneous rumination in sheep, the effect of cold water on the paunch of sheep, and the mechanism of regurgitation by stimulation of the vagus nerve in sheep and dogs.

The results indicate that regurgitation is not induced because of intrathoracic suction, as it can take place with an open thorax. Furthermore, neither intrathoracic nor intratracheal pressure is altered. Regurgitation takes place through a strong contraction of the diaphragm, which compresses the paunch and reticulum and raises the intra-abdominal pressure. It is a series of coordinated reflexes, which originate voluntarily, but once started can not be stopped by a slight narcosis or nervous stimulation. As in the case of vomiting, there was no antiperistaltic contraction of the esophagus.

Contribution to the knowledge of rumination, A. AGGAZZOTTI (*Pflüger's Arch. Physiol., 133 (1910), No. 4–6, pp. 201–224, figs. 8*).—The author continued the studies along the same lines as in the article above.

In sheep the cardia is normally open, but is closed when the main branch of the peripheral vagus nerve is stimulated. This did not explain the failure to regurgitate and ruminate, for this failure occurs on poisoning with curare. Electrical and mechanical stimulation of the mucous membrane of the reticulum and rumen caused the muscular walls to contract, but without regurgitation. Apomorphin and tartar emetic did not cause regurgitation or rumination. The esophageal furrow functions and assists in the act of regurgitation.

The fermentation processes of digestion in ruminants, I. MARKOFF (*Biochem. Ztschr., 34 (1911), No. 3–4, pp. 211–232, fig. 1*).—Gases were withdrawn by means of tubes from the paunch and colon of oxen and goats.

The amount of carbonic-acid gas from the stomach was sometimes less and at other times exceeded that of methan, whereas in the colon it was always less. In an animal on a diet composed wholly of hay, or when in a condition of hunger, there was considerable less carbonic acid than methan. On a diet of beets and hay the proportions were about equal, whereas the addition of oats increased the proportion of carbonic acid and hydrogen,

Whenever the stomach contents were removed and fermented in vitro ther was 3 or 4 times as much carbonic acid as methan. This indicated that th carbonic acid was absorbed in the stomach. The quantity of hydrogen wa much less than that of methan in both stomach and colon. In fermentatio experiments the amounts of both hydrogen and carbonic acid were increase when soluble carbohydrates were added to the fermenting contents of stomac and colon.

Annual review of investigations in general biology, edited by Y. DELAG (*Ann. Biol. [Paris], 13 (1908), pp. XVII+517*).—A bibliography of literature published in 1908 on the cell, reproduction, heredity, variation, the origin of species, and related topics. Abstracts are given of the more important publications.

Some neglected factors in evolution.—An essay in constructive biology, H. M. BERNARD (*New York and London, 1911, pp. XXI+489, figs. 47*).—A study of the finer structure of protoplasm, and in particular of those tissues which can not be satisfactorily explained by the cell theory, which is accordingly replaced by the protomitomic network theory in which the cell is conceived primarily as a continuous linin chromatin network with a differentiated center, which is a storehouse for chromatin, the whole being imbedded in an albuminous semifluid matrix. According to this theory, the linin network within the nucleus and the cytoplasmic meshwork outside are fundamental parts of one and the same reticulum, though possibly coated over with different substances, and the nuclear membrane is a felting of the threads of the protomitomic network. The network of the nucleus as the organic center is continuous with the network of the cell body.

The common belief that chromatin is the hereditary substance is said to be only consistent with total ignorance of the existence of the underlying reticulum of linin threads, and scattered observations as to chromatin are difficult to correlate into a coherent doctrine of its functions and importance.

Part 1 closes with a chapter on growth in which a psychic force is invoked to account for ordered growths. In part 2 evolution is explained by means of 5 structural units. The factor commonly neglected which is here most emphasized is cosmic rhythm.

The development of the germ cells in the mammalian ovary, with special reference to the early phases of maturation, A. LOUISE MCILROY (*Proc. Roy. Soc. Edinb., 31 (1910–11), No. 1, pp. 151–178, pls. 6*).—A report of studies of the ovary in embryo and newly born young of the rabbit, cat, dog, pig, and man.

Among many conclusions are the following: The same general plan of development is followed among the varied types of mammalian ovary, the variation depending upon the rate of ante and post-natal development, the cells maturing from the periphery inwards. Mitosis occurs among the oogonia, and also among the primary oocytes of the reticular stage, but ceases at a given stage in the development of the ovary. The follicle cells, which form the cells of the stratum granulosum, are derived from the oogonia and not from the stroma cells. The reserve cells (oogonia and regressive oocytes scattered throughout the ovarian tissue) may function as follicle or as interstitial cells, and may become absorbed as pabulum for the developing oocyte. The nucleolus persists during all of the stages of transition of the nucleus, although its staining capacity may vary.

Experiments on the time required to fertilize the egg of the fowl, J. L. FRATEUR (*Rev. Gén. Agron., n. ser., 6 (1911), No. 8, pp. 314–317*).—Eggs were fertile on the second day after the cock was put into the yard in the case of 2 groups of hens. In other cases it required from 3 to 4 days to fertilize eggs.

Abnormal bone growth in the absence of functioning testicles, A. C. GEDDES (*Proc. Roy. Soc. Edinb., 31 (1910–11), No. 1, pp. 100–150, pls. 3*).—This article reports anatomical, histological, and physiological studies of fowls, dogs, guinea pigs, cattle, and man, in which the subjects were castrated or had nonfunctional testicles.

In the absence of functioning testicles the process of endochondral ossification is stimulated and prolonged, but all cartilages are not affected equally. The bones most markedly affected are the bones of the leg, next those of the forearm, next the thigh and arm, limb girdles, and vertebral column.

Observations at the slaughterhouses showed that a bull's epiphyses joined the bone shafts by the time he was 2 years old, whereas in the bullock endochondral ossification is not complete until he is 3 or 4 years of age. The effect of castration is to cause an excess of nutritive material to be absorbed by the cartilage cells, which proliferate rapidly and are liable to die by surfeit, accompanied by an increased rate of growth in the epiphysial cartilages.

A bibliography is appended.

The effects of semispaying and of semicastration on the sex ratio of the albino rat (Mus norvegicus albinus), HELEN D. KING (*Jour. Expt. Zool., 10 (1911), No. 4, pp. 381–392*).—To test the right and left ovary hypothesis the ovaries and testicles were removed from one side of albino rats, with the following results: "Each ovary produces eggs that are capable of developing into males and also eggs that can develop into females. Each testicle contains spermatozoa that are able to fertilize the eggs from either ovary, and eggs thus fertilized develop either into males or into females. The sex ratio is not altered in any way by semispaying or by semicastrating the breeding animals. It follows, therefore, that (a) if sex is determined in the ovary, female-producing and male-producing eggs are developed in approximately equal numbers in each ovary of the normal female; (b) if the male is responsible for sex, female-producing and male-producing spermatozoa are developed in approximately equal numbers in each testicle of the normal male."

Studies in the experimental analysis of sex.—VII, Sexual changes in the blood and liver of Carcinus mænas, G. SMITH (*Quart. Jour. Micros. Sci. [London], n. ser., 57 (1911), No. 226, pp. 251–265*).—In earlier work (E. S. R., 25, p. 772), it was pointed out that the adult female organism at the time of the ripening of the ovary is engaged in elaborating reserve material, especially of a fatty nature, and that this substance is conveyed in the body fluids to the ovary and may have some connection in the development of many female secondary sexual characters.

A further study of the changes in the bood and liver of *Carcinus mænas* indicates that the blood of the female at the time of the ripening of the ovary contains more than twice as much fatty material as the blood of the male, even when the latter is mobilizing its fat to the greatest extent, and that Sacculina exerts a marked influence upon the fat metabolism of the host. This is entirely consistent with the view that it influences the host to assume the female characters by acting the same part in the fat metabolism as the ripening ovary does in the normal female.

The effect of Sacculina upon the fat metabolism of its host, G. C. ROBSON (*Quart. Jour. Micros. Sci. [London], n. ser., 57 (1911), No. 226, pp. 267–278, figs. 2*).—This is work along lines which support the results reported in the abstract noted above.

Is early maturity in domesticated animals a sign of degeneracy similar to cretinism, or a normal condition due to high breeding? W. BORMANN (*Ist die Frühreife der Haustiere eine Degenerationserscheinung (cretinistischer, cre-*

tinoider oder anderer Art) oder ist sie ein normaler Zustand hochgezüchteter Rassen? Inaug. Diss., Univ. Bern, 1911, pp. 31).—From studies of swine the author concludes that early maturity is not a pathological condition, similar to cretinism, but that it is an abnormal tendency toward the deposition of an excessive amount of fat in the tissue brought about by changes in feeding and breeding.

A bibliography is appended.

Studies of brachymelia in domesticated animals, E. PLATTNER (*Studien über die "Brachymelie" bei Haustieren und deren Ursachen. Inaug. Diss., Univ. Bern, 1911, pp. 77+III, pls. 10*).—A study of fetal tissues of brachymelic animals led to the conclusion that short-leggedness as in the dachshund, Ancon sheep, etc., is a condition quite different from rachitis, being a hypoplastic form of Chondrodystrophia fœtalis. It appears as a mutation and is inherited similarly to other dominant characters.

A bibliography is appended.

A study of dark pigmentation in domesticated animals, H. THAL (*Studien über die Dunkelfärbung bei Haustieren. Inaug. Diss., Univ. Bern, 1910, pp. 48*).—As a result of his own observations, and a survey of the literature on the subject, the author reaches the conclusion that a strong constitution in animals is associated with dark pigmentation.

A bibliography on the subject is appended.

Mutations in living beings, L. BLARINGHEM (*Les Transformations brusques des êtres Vivants. Paris, 1911, pp. 353, figs. 49*).—This is a general treatise on heredity and variation, in which considerable stress is laid on the importance of mutation in the evolution of species and that mutations may be brought about by mutilation.

"Genotype" and "pure line," H. S. JENNINGS (*Science, n. ser., 34 (1911), No. 885, pp. 841, 842*).—The diversities in the usage of the terms "genotype" and "pure line" are pointed out.

[Mendelian inheritance], T. H. MORGAN (*Science, n. ser., 34 (1911), Nos. 873, p. 384; 880, pp. 636–638; 887, pp. 918, 919; Jour. Expt. Zool., 11 (1911), No. 4, pp. 365–421, pl. 1; Ann. N. Y. Acad. Sci., 21 (1911), pp. 87–117, pls. 3*).—These articles report the inheritance of coat colors in crossing different varieties of mice. The factors concerned in the inheritance of coat color are discussed, and the association hypothesis is proposed to explain cases where the presence and absence hypothesis is inadequate.

[Mendelian inheritance] (*Science, n. ser., 34 (1911), Nos. 877, pp. 512, 513; 878, p. 563*).—These are criticisms by R. A. Emerson and C. C. Little on the articles noted above.

Studies on the cattle of Africa and Polynesia and their relation to each other, E. BREITUNG (*Studien über die Rinder Afrikas und Polynesiens und ihren Zusammenhang untereinander. Inaug. Diss., Univ. Bern, 1910, pp. 76, tables 5, pl. 1*).—Measurements of cattle in the Mariana Islands and the different types in Africa are given. It is concluded that the cattle of Polynesia are of the same general types as those of Africa. They were brought from South America to Polynesia and Melanesia in the sixteenth century.

A bibliography is appended.

Investigations of the skulls of Japanese Bovidæ, K. IGUCHI (*Jour. Col. Agr. Tohoku Imp. Univ., 4 (1911), No. 4, pp. 191–213, pls. 5*).—The author reports measurements of skulls of different types of Japanese cattle, and comparisons are made between these and European breeds.

East Indian cattle in Jamaica, J. D. DREHER (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 2, p. 38*).—An account of the progress made in crossing the zebu from India with the different breeds imported from England.

Measuring prize animals, C. VOITELLIER (*Bul. Mens. Off. Renscig. Agr. [Paris], 10 (1911), No. 9, pp. 1064–1077*).—This article describes the methods of taking measurements of cattle. Measurements are given of prize animals belonging to the Normandy, Durham, Parthenaise, Jersey, and Briton breeds.

Slaughtering of young calves (*Jour. Bd. Agr. [London], 18 (1911), No. 5, pp. 400–495*).—An editorial which calls attention to the shortage in store cattle, due in large part to the slaughtering of young calves for veal. Remedial measures are suggested.

Committee on the British export trade in live stock (*Jour. Bd. Agr. [London], 18 (1911), No. 9, pp. 769–772*).—This contains recommendations of the official committee appointed to report on the export trade in live stock.

Annual wool review (*Bul. Nat. Assoc. Wool Manfrs., 41 (1911), No. 4, pp. 499–558*).—This contains an estimate of the domestic wool clip of 1911, and other statistical tables.

A study of kemps, H. PRIESTMAN (*Bul. Nat. Assoc. Wool Manfrs., 41 (1911), No. 2, pp. 245–264, figs. 12*).—A study of dead fibers in wool, which cause much trouble in the manufacture of woolen goods.

Hygroscopic qualities of wool, W. D. HARTSHORNE (*Bul. Nat. Assoc. Wool Manfrs., 41 (1911), No. 1, pp. 108–118, pls. 9*).—A continuation of a discussion previously noted (E. S. R., 25, p. 75).

West Virginia as a poultry State, H. ATWOOD (*West Virginia Sta. Bul. 135, pp. 109–159, figs. 12*).—This is a popular work on methods of raising poultry, with special reference to the advantages which West Virginia offers to this industry.

The poultry industry in Germany, Denmark, Sweden, Holland, Belgium, France, and England, D. MARCHIORI, L. VIANELLO, and O. MUNERATI (*Bol. Min. Agr., Indus. e Com. [Rome], 10 (1911), Ser. C, No. 5, pp. 9–33*).—A report of the commission which investigated the conditions in European countries in order to gather information for the encouragement of the poultry industry in Italy.

[Instruction in poultry raising], E. W. BENJAMIN (*Metropol. and Rural Home, 26 (1912), No. 1, pp. 5, 7, 18, figs. 4*).—This is an account of the equipment and methods of instruction used, with a list of the publications issued by the poultry department at Cornell.

Profitable poultry production, M. G. KAINS (*New York, 1910, pp. IX+278, pls. 7, figs. 94*).—This book treats of all phases of poultry raising, and points out the advantages of poultry as a means of making money. Special emphasis is laid upon the most essential practices to be observed by one wishing to meet with success.

Studies on hybrid ducks, H. D. GOODALE (*Jour. Expt. Zool., 10 (1911), No. 3, pp. 241–254, figs. 10*).—A preliminary report of the reciprocal crosses made with Pekin and Rouen ducks.

Breeding ostriches for plumes, C. E. HOLDEN (*Amer. Breeders Mag., 2 (1911), No. 3, pp. 188–193, figs. 3*).—This is an account of ostrich breeding as conducted on a farm in southern California.

Supplementary observations on the development of the Canadian oyster, J. STAFFORD (*Amer. Nat., 46 (1912), No. 541, pp. 29–40*).—A continuation of earlier work (E. S. R., 23, p. 478). The author studied the British Columbia oyster and the Prince Edward Island oysters which had been transplanted to the vicinity of Vancouver Island. Comparisons are made between the 2 species of oysters, and details are given for collecting oyster larvæ by the plankton net. The method is thought to be of great economic importance in oyster culture.

DAIRY FARMING—DAIRYING.

The cost of producing Minnesota dairy products, 1904–1909, T. P. COOPER (*Minnesota Sta. Bul. 124, pp. 89–188, figs. 12; U. S. Dept. Agr., Bur. Statis. Bul. 88, pp. 84, pls. 2, figs. 13*).—The work reported in these bulletins was done by the Minnesota Station in cooperation with this Department, and is an investigation of the cost of producing dairy products on 3 groups of Minnesota farms.

The purpose was to determine the cost of production as represented by 3 different phases of agricultural development, (1) at Halstad, Minn., where grain growing is the prominent feature, (2) at Marshall, where agriculture is in the transition stage from grain growing to live stock production, and (3) at Northfield, where dairying is the most important industry. There were from 8 to 10 farms in each community, and the methods of collecting data were similar to those previously reported (E. S. R., 21, p. 188). The feeds consumed were charged at the farm price and not at the cost of production.

Average cost of milk production and income per cow on dairy farms.

Year.	Northfield.		Marshall.		Halstad.	
	Cost of milk per hundredweight.	Income per cow from milk.[1]	Cost of milk per hundredweight.	Income per cow from milk.[1]	Cost of milk per hundredweight.	Income per cow from milk.[1]
	Cents.		*Cents.*		*Cents.*	
1904	.....	.....	.....	.....	124.2	$25.57
1905	104.8	$53.04	.....	.....	116.9	31.18
1906	115.9	52.27	126.6	$29.67	123.0	32.30
1907	113.2	57.44	150.7	35.47	129.9	33.26
1908	132.2	63.83	97.4	46.72	131.1	48.12
1909	126.9	65.15	111.2	48.93	126.5	51.33

[1] Average from sales and from use in house and on farm.

It was found that the rise in income during the periods studied has been almost directly proportional to the rise in prices, while the increases or decreases in cost of maintenance have been very closely related to increased or decreased prices for feeds and labor.

A noteworthy point is the small proportion of dairy products used on the farm at Northfield, a district engaged in the sale of whole milk, and the great use of them at Marshall and Halstad, the creamery districts.

The almost constant increase in the income from year to year was ascribed, first, to the advance in prices of dairy products, and second, to the increased production of milk or milk fat per cow. At Northfield the income was affected to a greater extent by an increase in prices than in the other sections.

It is pointed out that a serious error in feeding the farm cow is the lack of liberality, and that at ordinary prices the cow giving only average yields must often be kept at a money loss. The increased profits from cows of high productivity are well illustrated by a comparison between the cow giving 10,000 lbs. and one giving 4,000 lbs. of milk.

"The data accumulated show very clearly that under average farm conditions the cost of milk or butter fat production is high and that, based upon cost alone, the income from products sold is not sufficiently high to cover cost of production. It should be remembered, however, that this investigation is concerned with the cost or income as obtained from groups of farms; that these groups, as nearly representative as can be obtained, are managed by individuals operating the enterprise at varying profits or loss. Some attain a high profit, others invariably operate at a loss, depending upon managerial skill and the

productivity of their herds. Averages reflect the practice, usage, and returns from the group, but do not reflect the cost of production that may be attained by the skilled individual manager. . . .

"The financial results, as shown in the appendix, give the effect that the dairy enterprise has had upon net income irrespective of its relation to fertility of the land or upon crop productions. On the Northfield route, 1905–1909, the net income as obtained from the dairy enterprise, which takes into consideration not only the sales of product, but also profits obtained through the sale of dairy stock, was $10,444.99, or $2.089 per year for an average of 116 cows. This profit has been obtained through sales of live stock rather than from the milk, but has had a very marked effect upon the profits of the farm as a whole. At Marshall, 1906–1909, the dairy enterprise was operated at a net loss of $438.97, or $109.74 per year, an average of $2.88 per cow annually. Halstad also showed an operating loss, amounting to $4,222.19 for 1904–1909, or $703.70 per year, an average of $8.91 per cow annually. However, in spite of the operating loss in direct income, due chiefly to uneconomical forms of production, the dairy enterprise has aided materially in making the farm business, as a whole, more profitable. Detailed study of cost of production and of the items of cost which affect efficiency, hence, the cost of production per unit of product, indicates clearly the possibilities of direct profit that may be obtained from this enterprise."

A digestion trial with two Jersey cows on full ration and on maintenance, C. H. Eckles (*Missouri Sta. Research Bul. 4, pp. 5–22, pl. 1*).—This bulletin is devoted to a summary of work previously noted (E. S. R., 24, p. 76), with some additional data. A digestion trial is also reported with the same 2 cows when dry and on a maintenance ration.

"The ration used was the same in both trials except in quantity. When on full ration the percentage digested was lower with both animals and for each constituent of the ration than the average figures in common use.

"The cow which received the most liberal ration digested 66.27 per cent of the entire ration. According to the digestion coefficients in common use she should have digested 70.81 per cent. The same cow on maintenance digested 73.79 per cent of the ration. The average figures for the same ration are 69.1 per cent. The second cow, receiving about 50 per cent less feed, during the trial when in milk digested 66.95 per cent of the ration. On maintenance the same animal digested 72.19. According to the average figures in use she should have digested 70.79 per cent in the first trial and 69.7 for the second.

"These results suggest that the average digestion coefficients in use are somewhat high as applied to cows producing large quantities of milk which requires a heavy ration and that accurate figures for this purpose should be obtained from experiments with cows in milk."

Maintenance trials with five Jersey cows, C. H. Eckles (*Missouri Sta. Research Bul. 5, pp. 25–48, figs. 3*).—The maintenance requirement was determined for the 2 cows used in the work noted above, and for 3 other high-class Jersey cows for periods ranging from 120 to 180 days. Four of these received the same ration, except in amount, as when in full flow of milk, namely, corn silage 4 parts, alfalfa hay 1 part, and grain mixture 1 part. The fifth cow received the ration used at the station for fattening steers. Chemical analyses were made of all the food consumed.

"The data presented show that while there was some variation with the individuals the 4 receiving the normal dairy ration averaged 6.08 therms per 1,000 lbs. calculated by using Armsby's 'Production Value' tables.

"A comparison was made with Haecker's standard by reducing it to energy value by using Kellner's 'Production Values.' Calculated in this way the energy value of Haecker's ration is 8.42 therms for 1,000 lbs. live weight.

Calculated in the same manner the average energy value required by the 4 cows receiving the normal ration was 8.61 therms.

"The average energy value of the ration given 2 cows, with which a digestion trial was made that admits of more accurate calculation, was 6.00 therms, while for animals of this weight the energy value required is estimated at 5.56 therms by Armsby.

"The general conclusion from the results with 4 Jersey cows is that the average maintenance requirements of these animals is quite close to the standard, suggested by Armsby and by Haecker."

Feeding experiments with milch cows, N. O. HOFMAN-BANG (*Ber. K. Vet. og Landbohöjskoles Lab. Landökonom. Forsög [Copenhagen], 74 (1911), pp. 78*).—The report gives an account of extensive experiments conducted under the direction of the Copenhagen Experiment Station for the purpose of determining the feeding value of wet brewers' grains and of soy-bean cakes for milch cows.

On replacing oil cakes by wet grains, the basal rations consisting of hay, straw, ruta-bagas, cotton-seed meal, peanut cakes, or soy-bean cakes, it was found that 5 kg. of wet grains was equivalent to 1 kg. of the high-protein cakes. Neither the milk production, the chemical composition of the milk, nor the condition of the cows was affected by the introduction of the wet grains into the feed rations in this proportion.

In other tests 1 kg. of soy-bean cakes fully replaced 1 kg. of the other high-protein cakes fed (cotton-seed meal, peanut cakes, sunflower cakes) without affecting the milk production, the condition of the cows, or the chemical composition of the milk. When good, fresh soy-bean cakes were fed, no deleterious influence of feeding the cakes was traceable in the flavor or taste of the butter, even when these were fed excessively. In the latter case they produced butter of a hard consistency, so that the winter grain feed of the cows should not, therefore, be made up too heavily of soy-bean cakes.

Further investigations on the utilization of ammonium acetate and asparagin for maintenance and milk production, A. MORGEN, C. BEGER, and F. WESTHAUSSER (*Landw. Vers. Stat., 75 (1911), No. 3–4, pp. 265–320*).—The authors have continued their earlier work (E. S. R., 24, p. 369).

Whenever asparagin or ammonium acetate was given in the place of pure protein there was a decrease in milk production of about 25 per cent. When carbohydrates were substituted there was a decrease of 36 per cent. These results in general confirm those previously noted.

There was no favorable effect of ammonium acetate or asparagin on the quality of milk or upon the weight of the animal. No proof was obtained of indigestible pure protein, and it is thought that the increase of protein in the feces was due to a depression of the digestion coefficient. When the protein was replaced by amids there was no change in the products of metabolism, but in the case of carbohydrates there was an increase.

The record breakers of the dairy breeds (*Breeder's Gaz., 60 (1911), No. 25, pp. 1288, 1289, figs. 6*).—This contains the milk records of champion cows of the 6 leading dairy breeds.

Report of the Malmöhus County cow-testing associations, 1910–11, L. NANNESSON (*Malmö. Läns Hushåll. Sällsk. Kvrtlsskr., 1911, No. 3, pp. 394–511*).—The number of cow-testing associations in the county during the year was 160, with 2,479 different herds and 47,832 cows. The average production of the cows for the year was 3,501 kg. of milk and 112.69 kg. of butter fat, with an average of 3.22 per cent of fat. The cows ate on the average 2,322.6 "feed units," and produced 150.8 kg. of milk and 5.35 kg. of butter for each 100 feed units. The returns per 100 feed units at the price obtained for butter amounted to 11.45 crowns, or $3.07. The improvement in the production of the

cows and in the returns per unit of feed consumed from year to year since the associations were organized in the county is very marked.

Cattle breeding and dairying in Sweden, WINKLER (*Österr. Molk. Ztg., 18 (1911), Nos. 22, pp. 337–339; 23, pp. 353–356, figs. 2*).—A general account of dairy husbandry in Sweden, and the methods of making butter and different kinds of Swedish cheeses.

Twenty-fourth annual report of the Bernese Dairy School at Rütti-Zollikofen, A. PETER ET AL. (*Jahresber. Molk. Schule Rütti-Zollikofen, 24 (1910–11), pp. 64*).—This contains a report of the activities of the school, the chemical and physical constants of milk, butter, and buttermilk, statistics on the production of cheese, and feeding tests with swine, in which corn-germ cake was found to be inferior in feeding value to corn.

Report on the activities of the dairy institute at Proskau, KLEIN (*Ber. Milchw. Inst. Proskau, 1910–11, pp. 17*).—The chemical and physical constants of milk are reported, and a brief account of the activities of the school is given.

On the presence of sulphocyanogen in milk and its origin, STOECKLIN and CROCHETELLE (*Bul. Sta. Agron. Somme, 1910–11, pp 24–30, figs. 2*).—The presence of sulphocyanogen was found to be due to feeding colza cakes which had been adulterated with other cruciferous plants. The authors then studied, under the conditions which normally obtain in the stomach, the production of the poisonous principle with pure colza cake made in Amiens, France.

The maximum amount was produced in about 5 hours after coming in contact with water. The action was accelerated by small quantities of hydrochloric acid.

The action on the organism of dead tubercular microbes and of toxins not destroyed by heat in sterilized milk, BRUYNOGHE (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1910, Sect. 3, p. 162*).—A discussion of the question of whether sterilized milk from tuberculous cows can be a source of infection.

The author made experiments with tuberculous guinea-pigs, administering Koch's tuberculin with their food, but without observing any reaction. He considers that while Koch bacilli which have been killed during sterilization may possibly enter the lymphatic circulation, this is not a means of infection. On the other hand it may possibly render the organism immune.

The fat globules of milk in relation to churning, W. F. COOPER, W. H. NUTTALL and G. A. FREAK (*Jour. Agr. Sci., 4 (1911), No. 2, pp. 150–176, pls. 3, figs. 8*).—This article reviews the literature on the subject, and contains some additional data to those previously noted (E. S. R., 25, p. 582).

Investigations on skim milk and buttermilk, W. D. KOOPER (*Milchw. Zentbl., 7 (1911), No. 11, pp. 505–511*).—The average analysis of 4 samples of skim milk was as follows: Water 91.551, protein 3.147, casein 2.313, albumin 0.834, fat 0.182, milk sugar 4.274, lactic acid 0.137, and ash 0.659 per cent. Four samples of buttermilk gave the following average analysis: Water 91.509, protein 3.115, casein 2.182, albumin 0.933, fat 0.297, milk sugar 4.279, lactic acid 0.137, and ash 0.646 per cent. The viscosity of buttermilk was less, and the catalase and reductase greater, than that of skim milk.

Attention is called to buttermilk and skim milk as exceedingly cheap foods. At present prices in Germany the author estimates that 1 mark would purchase 2,562 food units in skim milk, 2,311 in buttermilk, 1,615 in whole milk, 552 in eggs, and 538 in lean beef.

The influence of salts upon the action of rennet on milk, A. F. S. KENT (*Jour. Physiol., 43 (1911), No. 5, p. XXIV*).—A preliminary report, in which the author draws the following conclusions:

"The weight of dry curd obtainable from a given quantity of milk by the action of rennet is influenced by the nature and amount of the salts present.

It is possible to increase the weight of dry curd obtainable from a given quantity of milk by an appropriate addition of suitable salts. The additional weight obtained . . . is apparently due principally to the presence of an increased amount of fat in the curd. The increase in the amount of protein in the curd brought about by the addition of salts to the milk appears to be small. It is possible to modify the physical character (the 'strength') of the curd by the addition of salts to the milk."

What factors affect the specific gravity of rennet whey? H. HÖFT (*Molk. Ztg. [Hildesheim], 25 (1911), No. 84, pp. 1587–1589*).—A study of the effect of the strength of rennet, length of time of ripening, temperature, and other factors affecting the specific gravity of whey, with a view of determining the yield of cheese. The work thus far indicates that the duration of the action of rennet before the separation of the whey is of the greatest importance.

Report on the results of experiments on the propagation of culture starters in dairying, W. STEVENSON (*West of Scot. Agr. Col. Bul. 50, 1909, pp. 78–105*).—A trial of several varieties of starters propagated under different conditions.

The disinfection of dairies by dry methods, O. LAXA (*Rev. Gén. Lait, 9 (1911), No. 1, pp. 8–16*).—The author reports experiments as to the effectiveness of different disinfectants used in sterilizing dairies in order to kill organisms which cause defects in butter and cheese. The resistance of numerous types of bacteria, yeasts, and molds to each method is given.

The public milk supply, H. A. MACEWEN (*London, Glasgow and Bombay, 1910, pp. VIII+182, figs. 36*).—This book discusses what a satisfactory milk supply should be and how it can be obtained. It is written chiefly for the use of health officers in the United Kingdom.

Existing and prospective legislation re milk supply, J. LINDSAY (*Jour. Meat and Milk Hyg., 1 (1911), No. 12, pp. 671–695*).—A brief statement of the law on this subject as it appears in the several statutes relating to Scotland, England, and Ireland, with a few observations and criticisms thereon.

Should the sale of market milk containing less than 2.7 per cent of fat be legalized? K. SCHULZ (*Ist es Zweckmässig und Berechtigt, in den Polizeiverordnungen von der in den Verkehr gebrachten Milch einen Mindestfettgehalt von 2.7% zu verlangen? Inaug. Diss., Univ. Bern, 1909, pp. 34*).—The author determined the fat content in the milk of 767 cows, and in only 20 cases was there less than 2.7 per cent of fat. The mixed milk of each herd always contained more than that amount.

Three outbreaks of typhoid fever traced to milk infection, E. O. JORDAN and E. E. IRONS (*Jour. Amer. Med. Assoc., 58 (1912), No. 3, pp. 169–172*).—The cases reported were outbreaks found to be due to bacilli carriers employed on dairy farms.

Milk and cream contests, A. C. BAER (*Hoard's Dairyman, 42 (1911), No. 47, pp. 1449, 1460*).—Attention is called to the educational value of these contents, which were first held at the National Dairy Show in 1906 under the direction of the Dairy Division of this Department. Awards are made for the best average score on the following points: Flavor and odor, visible dirt, fat, solids-not-fat, acidity, bottle and cap, and bacterial content. It is pointed out that local contests would be a great aid in improving the quality of milk.

A bacteriological study of Danish butter, O. JENSEN (*Rev. Gén. Lait, 8 (1910), No. 18, pp. 409–417; Centbl. Bakt. [etc.], 2. Abt., 29 (1911), No. 23–25, pp. 610–616; Molk. Ztg. Berlin, 21 (1911), No. 18, pp. 205–207*).—Lactic-acid bacilli were found to multiply much more rapidly in unwashed than in washed butter, but the reverse was true of streptococci. The most frequent species of yeasts were

typical Torulae, some of which did not decompose butter unless associated with bacteria. An increase of acidity favored the development of other undesirable yeasts. See also a previous note (E. S. R., 25, p. 780).

New Danish butter law, trans. by J. H. Monrad (*N. Y. Produce Rev. and Amer. Cream., 33 (1911), No. 10, p. 442; abs. in Milchw. Zentbl., 7 (1911), No. 7, 332–336*).—This contains the text of the new law which became effective December 10, 1911, in regard to the sale of butter. All butter containing between 16 and 20 per cent of moisture must be labeled "water butter."

Cheese and cheese production, G. Ellbrecht (*Ost og Osteproduktion. Copenhagen, 1911, pp. 264, figs. 146*).—The first part of this text-book deals with the general principles of cheese making, with special reference to the manufacture of Danish cheese of the Cheddar type, including cheese made from pasteurized milk. In the second part the methods of manufacturing casein and the following kinds of cheeses are discussed: Roquefort, Cantal, Laguiole, Camembert, Swiss, Stilton, Cheddar, Chester, Gouda, Edam, Leidner, Gorgonzola, Parmesan, Limburg, Backstein or Algau Limburg, Sap Sago, Swedish Estate, Norwegian Gammelost, and whey cheese (Myseost).

A bibliography is appended, and also statistical tables showing Danish cheese imports and exports from 1865 to 1909, the cheese imports and exports in European countries and America from 1890 to 1905, the international trade in cheese, cheese tariffs of different countries, and metric and Danish systems of weight and measures. The book is intended to be used as a text-book and for reference purposes.

On the investigation and judging of cheese, A. Behre and K. Frerichs (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 12, pp. 741–747*).—Analyses are reported of the following varieties of cheese: Roquefort, Gervais, Schweiz, Tilsit, Edam, Camembert, Brie, Liptau, Romadur, Neufchatel, Limburg, Harz, Thüring, breakfast, Lauterbach, Allgäu, and Altenburg zeigen (goat).

Touareg cheese, G. de Groncourt (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 3, pp. 191–194; abs. in Rev. Gén. Lait, 9 (1911), No. 1, p. 19*).—The author reports the analysis of samples of cheese made by the Touaregs as follows: Water 8.9, protein 38.59, soluble protein 1.77, ammonia 0, fat 36, ash 3.94, volatile acids 0, and lactic acid 5.08 per cent. The following organisms have been isolated from this cheese: *Mucor racemosus*, *Rhizopus nigricans*, *Penicillium glaucum*, *Oïdium lactis*, *Cryptococcus glutinis*, *Bacillus subtilis*, and *Micrococcus prodigiosus*. The methods of manufacturing cheese, as practiced in different localities, are described.

The cause of a black coloration of Emmental cheese, O. Allemann and J. Kürsteiner (*Molk. Ztg. Berlin, 21 (1911), No. 48, pp. 566–568*).—An abnormal black color in the cheese mass was found to be due to a bacterium and not to the presence of iron. A review of studies of other cases of cheese discoloration is given.

On the cause of the reddish brown spots on the rind of Emmental cheese, W. Staub (*Landw. Jahrb. Schweiz, 25 (1911), No. 6, pp. 371–380; Centbl. Bakt. (etc.), 2. Abt., 31 (1911), No. 16–22, pp. 454–466, pl. 1, fig. 1*).—This defect was found to be due to a mold and given the name *Penicillium casei*. The difference between this and other species of the genus is discussed, and measures for preventing the defect are suggested.

Annual review of imported dairy produce for year ended June 30, 1911 (*Weddell and Co. Ann. Rev. Imported Dairy Produce, 17 (1911), pp. 10*).—This contains statistics of the amounts and prices of butter and cheese imported into the United Kingdom from different countries.

VETERINARY MEDICINE.

Vade-mecum of veterinary medicine, H. MOLLEREAU, C. PORCHER, and E. NICOLAS (*Vade-Mecum du Vétérinaire. Paris, 1911, 4. ed., pp. XIV+339*).—The fourth revised edition of this work.

Comparative histologic investigations of the surface and glandular epithelium of the intestinal mucous membrane of domesticated animals, F. P. MARTIN (*Vergleichend-histiologische Untersuchungen über das Oberflächen- und Drüsenepithel der Darmschleimhaut der Haussäugertiere. Inaug. Diss., Univ. Leipsic, 1910, pp. 130, pls. 6*).—The results of a detailed examination of the epithelium of the intestinal tract of the horse, mule, bovine, sheep, goat, and cat, are given, with a bibliography embracing 400 titles.

The urine and other excretions and body fluids of man and animal, C. NEUBERG ET AL. (*Der Harn sowie die Übrigen Ausscheidungen und Körperflüssigkeiten von Munsch und Tier. Berlin, 1911, vols. 1, pp. XXXIX+955, figs. 101; 2, pp. 956–1823, pls. 3, figs. 132*).—This massive work, which deals with the physical, chemical, and biological examination of urine and other body fluids and excreta and their composition under normal, pathological, and experimental conditions has been prepared for use by physicians, chemists, pharmacists, agricultural experiment stations, etc.

In regard to paratyphoid infections by meat products, with a contribution to the bacteriological examination of meat, E. GLASER (*Ztschr. Hyg. u. Infektionskrank., 67 (1910), No. 3, pp. 459–511*).—In meat and bologna, particularly in smoked goods, the paratyphoid bacillus was detected by cultural methods and the agglutination test. The city of Vienna, where these samples were collected, is comparatively free from typhoid fever. The presence of these organisms in meats and meat goods intended for consumption in the uncooked state, and in animals necessarily slaughtered, even when they are boiled before eating, is to be condemned. The germs were found most often in meats.

The cultural detection of paratyphoid B bacilli by enrichment in papayotin and sodium chlorid bouillon followed by plating is considered a good method for detecting these organisms. Basenau's method is deemed worthless. The *proteus* varieties grow not only upon malachit green-, Drigalski-, and Endo-agar, but also behave in Löffler's solution as do the paratyphoid strains. As the bacteria of the *coli* group, especially paratyphoid B. Gärtner, and the *proteus* bacilli, have reducing properties, they can produce nitrites in meat which, when introduced into the alimentary canal, may produce an enteritis that will allow a passage of these organisms into the system, and thus lay a way open for a generalized infection.

Bacteriological investigation of raw chopped meat with particular reference to the bacilli of the paratyphoid group, E. ZWEIFEL (*Centbl. Bakt. [etc.], 1. Abt., Orig., 58 (1911), No. 2, pp. 115–125*).—Pathogenic bacilli were never found in raw chopped meat. There were, however, 23 suspicious strains noted which simulated the paratyphoid bacillus and 6 others which resembled the typhoid bacillus. On feeding these cultures to animals no pathological results could be noted.

Dunsickness, F. A. VERNEY (*Jour. Compar. Path. and Ther., 24 (1911), No. 3, pp. 226–229*).—The equine affection here considered, which is prevalent in certain parts of Natal, is said to resemble very closely that described by Gilruth from New Zealand as Winton disease or hepatic cirrhosis (E. S. R., 16, p. 1021). The disease was experimentally proved by Gilruth to be due to eating *Senecio jacobæa*. The author found *S. latifolius*, *S. coronatus*, and *S. rudiralis*, the first named in abundance, on a farm of 500 acres where the disease occurred

among recently introduced animals. The plant proved fatal when fed to guinea pigs, one animal dying in 16 hours after eating a good supply.

Toxic substances in Ascaris megalocephala (*Jour. Trop. Vet. Sci., 6 (1911), No. 4, pp. 550, 551*).—A brief review of some recent literature on the subject.

Disinfection, disinfecting substances, and their examination, A. REITZ (*Ztschr. Angew. Chem., 23 (1910), No. 47, pp. 2193–2201*).—This is a critical discussion in regard to disinfection and disinfectants in general, and the methods utilized to determine the efficiency of the disinfectants.

New treatment of infectious diseases; immunity, E. DOYEN (*Nouveau Traitement des Maladies Infecticuses; L'immunité. Paris, 1911, pp. 424*).—This book deals with the treatment of infectious and other diseases by mycolysins. The theories of immunity with particular regard to phagocytosis are discussed in detail. The material is presented in the form of lectures.

The detection of parasites with the complement fixation method, B. BUSSON (*Centbl. Bakt. [etc.], 1. Abt., Orig., 60 (1911), No. 5, pp. 426–433*).—With the complement fixation method and employing alcoholic extracts of the parasites as the antigens, it is possible to obtain a positive reaction in only a part of the cases. Negative results were obtained where the parasites were present for a long time and in large numbers. In a rabbit serum it was noted that there are often substances normally present which give complement fixation with alcoholic extracts of tapeworms or with an extract of heart muscle. This property can be stimulated by injecting substances usually indifferent to this reaction, such as leucin, tyrosin, and heart muscle extract. The serum of luetics will give the same complement fixation reaction as obtained with heart muscle extract or with alcoholic extracts of the tapeworm or echinococcus.

The present status of anaphylaxis, R. DOERR (*Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 7–8, pp. 49–132*).—A retrospect of the work done and theories in this regard. A bibliography of 232 titles is appended.

Hemagglutination, H. RAUBITSCHEK (*Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 11, pp. 181–200*).—A review of the principal work done along this line, with a critical discussion. A bibliography of 239 titles is appended.

The relation of the reaction of the culture medium to the production of hemolysin, E. E. ATKIN (*Jour. Hyg. [Cambridge], 11 (1911), No. 2, pp. 193–201, dgm. 1*).—"Many bacteria have an extensive range of growth in bouillon of varying reactions; some have a much more restricted range, as the streptococci obtained from the blood stream. There seems to be roughly a common optimum of growth when the reaction of the bouillon is neutral to phenolphthalein, provided that the medium is always prepared in the same way as described above. Although small differences may be desirable for individual bacteria, this reaction can be recommended for ordinary laboratory routine work. Most micro-organisms have some power of overcoming the inhibitory effect of excess of NaOH. This is much commoner than the capacity for overcoming excess of HCl which was observed in a few instances. The hemolysin production of *Vibrio nasik* is not limited to an optimum reaction, but is practically coextensive with its range of growth in media of varying reactions. In a series of bouillon cultures containing different quantities of alkali and acid, the amount of hemolysin produced was about the same in each case, but the time at which the maximum was reached was influenced by the reaction. This was modified in such a way that the most alkaline cultures produced hemolysin soonest and lost it again before the most acid ones. There seemed to be an optimum as regards length of duration of hemolysin in the culture in the case of the sample bearing the reaction, acid 5."

The precipitation of plant proteins, M. WILENKO (*Ztschr. Immunitätsf. Expt. Ther., I, Orig., 5 (1910), No. 1, pp. 91–104*).—Extracts of seeds w found to give the complement binding and precipitation reaction with prote of animal origin and when present in a definite ratio. Heterologous phyt bumins were found to produce precipitates, but when they were heated 80° C. this property was lost without acquiring any fixing power. An exc of serum, however, showed powers of fixation. The capacity of animal se to produce precipitates with phytalbumins is not destroyed if the sera a heated to 80°.

The specificity of the serum-precipitin reaction of the proteins, W. SCHMIDT (*Cairo Sci. Jour., 5 (1911), No. 62, pp. 271–289*).—The author dis cusses the general theory of serum-precipitin reactions and their practical ap plication in medico-legal practice and food inspection, the relationship rea tions between animals of different species, the specificity of precipitins fro different kinds of proteins from one and the same species, the influence o heat and alkali upon the specificity of the precipitins, and the practical valu of heat-alkali precipitins in the inspection of suspicious food preparations.

The effect of nuclein on the blood, B. F. KAUPP (*Amer. Vet. Rev., 40 (1911), No. 3, pp. 306–315*).—These experiments, which were conducted with 9 horses, were made for the purpose of determining the following points: (a) The effect of nuclein on erythrocytes, (b) the effect of nuclein on the hemaglobin, (c) the effect of nuclein on the time of coagulation, (d) the effect of nuclein on the power of phagocytosis, (e) the effect of nuclein on leucocytes, both in quantity and differentially, and (f) the effect of nuclein in vitro on the power of phagocytosis. The nuclein used was obtained from the wheat germ.

The author concludes that nuclein increases the total number of leucocytes in the blood, the polymorphonuclear leucocytes, and the power of phagocytosis of the individual leucocyte. It has no effect upon the erythrocyte or hemaglobin, or on the power of phagocytosis in vitro. It decreases the time of coagulation of the blood, and promises to be of great value in stopping hemorrhage in cases of wound seepage or injuries. To obtain the best results in cases of infectious diseases nuclein should be given hypodermatically, and in cases of hemorrhage intravenously.

Report on live stock conditions in Imperial Valley, C. L. ROADHOUSE (*California Sta. Bul. 219, pp. 1195–1222, figs. 20*).—Investigations of diseases of cattle in Imperial County are reported. This is one of the most important stock producing sections in California, live stock being shipped in from New Mexico, Arizona, and Mexico and fattened for the Los Angeles market. The status of the industry is briefly described and the water supply of the valley discussed.

During the course of these investigations, the author found acute keratitis to occur on several ranges, this disease being incorrectly known among stockmen as "pink eye." Nine of 204 cows tested with tuberculin reacted.

Summer sore in horses was found to be of frequent occurrence. In studies of 4 cases examinations of blood, made with a view to determining the presence of filaria embryos, resulted negatively. Many animals are affected with chronic dermatitis to a greater or lesser extent and while not incapacitated for work, they have an unthrifty appearance and fall off in condition due to the irritation and rubbing of the skin, mane, and tail.

Losses of hogs in the valley are due largely to the death of young pigs from necrotic dermatitis and to the lack of thrift in young pigs and grown hogs due to the presence of the hog louse. Necrotic dermatitis is said to appear in 3 forms: In the first the ears dry up, form crusts, and peel off; in the second scurf forms over the back, shoulders, and head, while in the third the disease appears as scale on the muzzle and face of young pigs. Several raisers in

Imperial County report having had many pigs killed by ants; the species concerned is supposed to be *Pogonomyrmex californicus*. The occurrence of abscesses in hogs has been recognized and complained of by the meat packers buying hogs in this locality.

Report of special investigations in Imperial County, June 5 to 15, 1911, F. M. HAYES (*California Sta. Bul. 219, pp. 1223–1229*).—After the investigations noted above had been completed the California Station received many letters from residents of the valley, indicating that there existed a serious disease among hogs. This led to the investigation here reported, which resulted in finding that most of the losses during the spring and early summer months were produced by an attenuated form of hog cholera. A seeming peculiarity of this type of cholera was that it attacked mostly the little pigs just before or shortly after weaning time, and that the affected pigs often lingered from 10 days to 2 or 3 weeks, and some even recovered. Many of the larger hogs were entirely immune to attacks.

Brief notes are also presented on sore mouth in pigs, diarrhea in little pigs, chronic cough of swine, blackleg in calves, bronchitis in calves, and on some methods of disinfection following infectious diseases.

Trypanblue in infectious anemia, A. W. WHITEHOUSE (*Amer. Vet. Rev., 39 (1911), No. 5, pp. 571–574*).—Previously noted (E. S. R., 25, p. 587).

A serious outbreak of anthrax checked by strict quarantine and vaccination, W. W. YARD (*Amer. Vet. Rev., 40 (1911), No. 2, pp. 246, 247*).—A description of an outbreak which was checked by quarantining, burning the dead animals, and inoculation with Pasteur's vaccine.

Pasteur vaccination, sero-vaccination, and serum therapy for combating anthrax, G. MASINI (*Clin. Vet. [Milan], Rass. Pol. Sanit. e Ig., 34 (1911), No. 3, pp. 97–114; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 39, p. 711*).—The serum method is better than the Pasteur method. Better results can be obtained if the protective and curative treatments are combined.

The serological meiostagmin reaction in carcinoma, STAMMLER (*München. Med. Wchnschr., 58 (1911), No. 30, p. 1643*).—A discussion in regard to when the reaction will give positive results for malignant growths. Conditions are also discussed under which the meiostagmin reaction can be obtained with other diseases.

Carcinoma on the skull of a horse, EMSHOFF (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 15, p. 284, fig. 1*).—A description of a case which is accompanied by an illustration of the skull, and the autopsical findings.

Coccidiosis of the fowl and calf, W. JOWETT (*Jour. Compar. Path. and Ther., 24 (1911), No. 3, pp. 207–225, figs. 10*).—The author has investigated coccidiosis of the fowl which has occurred in the vicinity of Cape Town during the past few years with a somewhat extensive mortality, especially among young chicks of from a week to a month old. A short account of the disease is presented, together with a brief description of its causal agent. "While agreeing that *Eimeria avium* and *E. cuniculi* probably constitute distinct and separate species, the present writer believes that *E. stiedæ* (*E. cuniculi*) is capable of producing coccidiosis in the young chicken under certain conditions, as well as in rabbits. But whether, on the other hand, *E. avium* is capable of producing coccidiosis in rabbits is not very clear."

A brief report of a case of coccidiosis, red diarrhea, or dysentery in a calf, due to *Coccidium bovis*, that was studied by the author at Cape Town follows. It is stated that this disease of the calf does not appear to have been met with previously in South Africa.

The serum of glandered animals as a precipitant for mallein, L. PANISSET (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 3, pp. 132, 133; abs. in Ztschr.*

Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 6, p. 13).—The serum fr horses affected with glanders yields a precipitate when treated with an extr of the glanders bacillus in a definite concentration. The reaction is consider specific.

Resistance of the Micrococcus melitensis during lactic-acid fermentatio P. DARBOIS (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 3, pp. 102–104; a in Bul. Inst. Pasteur, 9 (1911), No. 13, p. 613*).—*M. melitensis* was found survive 3 weeks in sour milk, or in cheese prepared from milk containing t lactic-acid bacillus.

The treatment of pneumonia and pleurisy, H. P. HOSKINS (*Amer. Vet. Re 40 (1911), No. 1, pp. 49–55*).—A discussion in regard to the various forms treatments required for these conditions.

Poll-evil, R. C. MOORE (*Amer. Vet. Rev., 40 (1911), No. 2, pp. 207–21 fig. 1*).—In this article the etiology, tissues involved, course, prognosis, an treatment (conservative and radical surgical and bacterium therapy) ar considered.

Tuberculosis among ground squirrels (Citellus beecheyi), G. W. MCCOY an C. W. CHAPIN (*Jour. Med. Research, 25 (1911), No. 1, pp. 189–198*).—"Five cases of natural tubercle infection in ground squirrels have been observed. The gross pathology in these animals was as follows: Two had lesions of the lymph glands alone, one of the lungs alone, one of the lungs and the omentum, and one of the liver alone. As compared with a human strain of the same age and number of generations the growth on artificial media was far less luxuriant than that of the culture derived from man. The virulence of the squirrel cultures, judged by their effect on rabbits, agrees with that of the bovine type of *Bacillus tuberculosis*."

The influence of fresh and autolyzed organ extracts on experimental tuberculosis, W. C. WHITE and E. ZEUBLIN (*Jour. Infect. Diseases, 8 (1911), No. 2, pp. 176–189*).—Autolyzed extracts of rabbit lungs contain a factor which when incubated with the tubercle bacillus changes its virulence. This, however, is said not to be due to a dissolution of the bacillus. Various hypotheses are presented in regard to the possible causes for this phenomenon.

In regard to tuberculosis of the bladder, M. BRETON (*Ann. Inst. Pasteur, 24 (1910), No. 24, pp. 820–825; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 15–16, p. 455*).—The production of tuberculosis of the bladder by way of the urethra was found to be possible in the guinea pig, but very difficult in the rabbit, indicating that a difference in regard to receptivity of infection must exist among the various animals. No initial trauma was necessary for the production of infection in the guinea pig. In all cases the kidneys remained intact.

The common method of infection in human and bovine tuberculosis, J. MCFADYEAN (*Vet. Jour., 67 (1911), No. 430, pp. 197–217*).—A discussion of work already published on the channels of infection in tuberculosis, from which it is concluded that inhalation is the most common source of infection. This is a return to the original Koch theory.

The clinical diagnosis of bovine tuberculosis, FÜRSTENAU (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 39, pp. 706, 707*).—A discussion of the methods of auscultation, sputum catching, and the ophthalmic reaction for diagnosing tuberculosis. Special stress is laid upon the first 2 methods.

The precipitating reaction for the diagnosis of tuberculosis in bovines. G. FINZI (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 3, pp. 127–131; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 6, pp. 20, 21*).—The test was conducted by diluting 4 parts of the serum with 1 part of glycerin

bouillon culture. In all of the 12 cases of tuberculosis examined definite precipitates were obtained.

Tuberculin preparations are deemed of less value for conducting the test than glycerin bouillon cultures.

Tuberculin as a diagnostic agent, A. R. LITTLEJOHN (*Vet. Jour., 67 (1911), No. 432, pp. 330–344*).—This article considers practically all of the well-known tuberculin tests, and compares their respective values, both for man and animals. The therapeutic value of tuberculin is also considered.

In regard to the value of the microscopic examination and the newer staining methods for diagnosing tuberculosis in the urinary channels, G. SCHUSTER (*Deut. Med. Wchnschr., 36 (1910), No. 39, pp. 1806, 1807; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 15–16, pp. 472, 473*).—If smegma bacilli and tubercle bacilli are present at the same time the danger exists when decolorizing the smegma bacillus (which is a strong acid-fast organism) of also decolorizing the tubercle bacillus. It is, therefore, recommended to use the urine obtained by catheterization and to conduct the first staining carefully, using only dilute nitric acid. If a positive finding is then obtained the urine itself is treated with antiformin and finally with corallin. A negative finding with this method does not point definitely to the nonexistence of tuberculosis, and when in doubt the animal test must be employed.

Prophylaxis in bovine tuberculosis, BAUZÁ (*Tuberculosa [Montevideo], 1910, No. 12; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 10, pp. 528, 529*).—In Montevideo there exists a national committee on the suppression of tuberculosis in animals. The percentage of tuberculous animals is less in Uruguay than in some of the European countries. All animals condemned as tuberculous are bought by the State at a rate of 25 per cent ad valorem.

A treatise on the diseases of cattle, G. MOUSSU (*Traité des Maladies du Bétail. Paris, 1911, 3. ed., pp. VI+1003, pls. 18, figs. 348*).—This is a third revised edition. An English edition has been previously noted (E. S. R., 17, p. 804).

Quiet rabies in bovines, M. HEKS (*Állatorvosi Lapok, 32 (1909), No. 50, pp. 614–616; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 39, p. 710*).—In a barn containing a number of valuable animals 11 died within 2 weeks time. On autopsy the animals were found to be victims of rabies.

The campaign against the ox warble in Denmark, N. VILLEMOES (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 9, pp. 277–279; abs. in Jour. Compar. Path. and Ther., 24 (1911), No. 3, pp. 248–250*).—A brief account is given of the manner in which the campaign against the warble fly inaugurated in the Skjærum district about 10 years ago has been conducted and the progress made.

During the period 1902 to 1910 the number of cows treated averaged about 2,200 and the number of young animals about 1,700. The number of larvæ destroyed dropped from 22,394 in 1902 to 3,875 in 1910. The decrease, however, was not regular, there being increases in the years 1907 and 1909. The results obtained in this district show that if the destruction of the fly is carried on energetically and methodically good results may be expected.

A "ring" dipping bath (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 4, p. 284, figs. 3*).—A circular type of dipping vat which has been in use at Tapanui for some time is described and illustrated.

Which muscles should be examined for trichinæ? BERGMAN (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 8, pp. 243–249; abs. in Jour. Compar. Path. and Ther., 24 (1911), No. 3, pp. 275–278*).—The author's conclusions are as follows: "In practical inspection for trichinæ the pieces of tissue should be taken from

the pillars of the diaphragm. One piece only should be taken from each pig. Twenty-four preparations the size of an oat grain should be examined from each piece taken. The piece of tissue removed should always contain tendon tissue. If trichinæ are found, fresh pieces should be taken for control examinations."

Cause and treatment of pulmonary emphysema, W. G. HOLLINGWORTH (*Amer. Vet. Rev., 40 (1911), No. 2, pp. 223–228*).—This is a discussion in regard to the supposed etiological factors of the various forms of this condition and the curative, or palliative treatment. A discussion is also included in regard to the setting aside of a contract or sale on the basis of diagnosing the presence of broken wind in horses.

Administration of Salvarsan for the treatment of contagious pleuropneumonia in horses, RIPS (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 18, pp. 321–323*).—A description of the methods and the precautions to be taken while administering Salvarsan for the treatment of the pectoral form of equine influenza.

The trypanosomes found in two horses naturally infected in the Gambia, W. YORKE and B. BLACKLOCK (*Ann. Trop. Med. and Par., 5 (1911), No. 3, pp. 413–434, pl. 1*).—The trypanosome found in one of the horses is thought to have been *Trypanosoma dimorphon*. A long form found in the other horse appeared to be *T. vivax*, but a short form was not assigned a position. It is thought that it may have been either a dimorphon-like trypanosome of low pathogenicity or simply a modification of the long parasite.

The distribution of Piroplasma canis in infected dogs that have been treated with arsenic preparations, E. GOLDSCHMID (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 6, pp. 663–688, pl. 1*).—This work reports investigations of the patho-anatomical changes in dogs infected with a Russian virus of *P. canis* which in part were treated with arsenic preparations.

Contributions to the pathological anatomy of fowl cholera, O. PREUSS (*Beitrag zur Pathologischen Anatomie der Geflügelcholera. Inaug. Diss., Univ. Bern, 1909, pp. 63*).—The material for this work was obtained from an enzootic which involved the death of 30 chickens. All animals came to autopsy.

It is concluded from this investigation that the pathological changes in the air sacs and other serous membranes of birds succumbing to fowl cholera are not constant ones, and therefore can not serve as a criterion for determining the length of time the disease is present or fixing the extent of the infection. The small grayish white to grayish yellow caseous foci in the liver were present in acute, subacute, and chronic cases. Their presence indicates infection with small amounts of fowl cholera bacteria. The receptivity of animals for the fowl cholera bacteria and the development of the pathological processes are not characteristic of a few types or species of birds, but vary among the individuals themselves. Guinea pigs and mice which were infected with this bacterium do not show any particular changes in the organs. The intestinal tract is the chief area infected.

Pellagrous symptoms produced experimentally in fowls by feeding maize spoiled by inoculation with a specific bacterium, C. C. BASS (*Jour. Amer. Med. Assoc., 57 (1911), No. 21, pp. 1684, 1685, figs. 2*).—The author, for a series of years, has collected bacteria from the stools of pellagra patients and from corn meal or bread supposed to have been the food of such patients at the time of intoxication. The cultures obtained were inoculated on sterile corn meal and fed to chickens from 2½ to 3½ months old. One of the chickens so fed contracted a disease which symptomatically resembled pellagra in man.

Tuberculosis of fowls, S. F. EDWARDS (*Ontario Dept. Agr. Bul. 193, 1911, pp. 20, figs. 14*).—This bulletin deals with the extent and distribution of avian

tuberculosis in the United States and Canada, the nature of avian tuberculosis, the seriousness of the losses, kind of birds affected with the disease, dissemination from outside sources and in the flock, detection of the disease, control of the disease, and disinfection of the premises.

The bulletin is plentifully illustrated with pathological material. A bibliography is appended.

On the so-called blackhead of turkeys, Y. WATANABÉ (*Trans. Sapporo Nat. Hist. Soc., 3 (1909–10), pp. 67–81*).—Blackhead has destroyed large numbers of turkeys on the farm of the agricultural college of the Tohoku Imperial University. The studies here reported lead the author to conclude that the disease is caused by a species of Amœba and not by bacteria found in the ceca. Whether or not *Amœba meliagridis* is the species concerned has not been determined.

The following is a summary of the studies reported: "The parasite attacks first the ceca, the histological structure of which is destroyed by it. Some of the parasitic organisms escape from the ceca through the Lieberkühn's crypt, into which it comes out, breaking up the crypt's walls. Passing through the portal vein, it comes then to the liver which is converted by it at last into hard plates. The parasite escapes from the liver through the bile-ducts. The parasite from the liver, together with that from the ceca, is cast off from the enteric canal through the vent, being intermingled with the excrement to infect other individuals. The direct mortal cause is the destruction of the ceca or liver, or of both the organs."

Some diseases and parasites of ostrich chicks, W. ROBERTSON (*Agr. Jour. Union So. Africa, 2 (1911), No. 3, pp. 309–317*).—Notes are presented on dronkziekte, ophthalmia, eversion of rectum, tapeworm (*Tænia struthionis*), and wireworm (*Strongylus douglassii*).

RURAL ECONOMICS.

Management of farm land.—Different systems of renting land as they affect both landlord and tenant, D. G. BEATY (*Farm and Home [Mass.], 33 (1912), No. 687, p. 17*).—This article gives concrete illustrations of different systems of renting land as applied to a farm in South Dakota and the returns to both landlord and tenant.

In 1903 the owner rented his 160-acre farm, valued at $5,600, for $320 cash. The tenant grew wheat, oats, and corn from which he received a net profit of $409. The following 2 years the owner furnished the seed and received half of the crops. His profits averaged $377 per year and the renter's $424. For the next 3 years the tenant furnished the seed and received two-thirds of the crop. The average profit per year to the owner was $386 and to the tenant $479. The proportion of the total net receipts accruing to the owner under the 3 systems was about 43, 47, and 44 per cent, respectively.

Owner's oversight of rented land, C. W. HOLMAN (*Farm and Ranch, 30 (1911), Nos. 51, pp. 5, 6; 52, p. 16, figs. 5*).—This article describes the run down condition of a farm due to mismanagement and the lack of the owner's oversight because of his absence, and shows by actual illustration what effect his moving back to the farm had upon the social and economic conditions of the tenants, the annual yields of the farm, and his net income.

Renters can pay for high-priced land, L. YOUNG (*Farm and Ranch, 31 (1912), No. 1, p. 1*).—This article gives the experience of 2 brothers, to illustrate the possibility of tenants paying for high-priced land.

Diversified farming with tenants in Louisiana (*Farm and Ranch, 31 (1912), No. 1, pp. 4, 5, figs. 8*).—This article presents the experience of a large cotton

planter in Louisiana who decided to dispense with cotton as a special cr diversify his crops, and adopt a part wage and part share system. He p ceeded to grow as many commodities needed on the farm as possible. He quired his tenants to reduce their cotton acreage to one-third of their custo ary amount, advancing no money on the cotton crop, but giving to each tena sufficient wage employment on the farm to sustain himself and family, whi the women and children worked the cotton, except the plowing. It is point out that by this system the owner has to a degree been able to fight the bo weevil successfully, increase his yields, improve his land, introduce better far machinery, adopt more modern methods of farming, and at the same tim increase the annual income of his tenants.

A social center in a renter neighborhood, C. W. HOLMAN (*Farm and Ranch 30 (1911), No. 52, pp. 2, 3, figs. 4*).—This article is a popular description of th establishment, growth, and success of a "social center" in western Texas, mad possible by a landlord with a 2,000-acre plantation, who constructed an audi torium thereon to be used for a school, church, neighborhood clubhouse, an assembly hall. Meetings composed of tenants, landlords, and their families an sometimes invited guests are held once or twice a week, when questions touch ing the interest of tenants, landlords, and the community are discussed.

The result has been a better understanding of the wants and needs of tenant and landlord, better methods of farming with increased income, more comforts and advantages, and greater appreciation of country life. In this particular instance the landlord has moved his home from the city to his plantation, made improvements in the housing of his tenants, and now has no difficulty in secur ing and retaining tenants who are more prosperous and contented than formerly.

The first cooperative law in the United States, G. KEEN (*Co-operation [Minneapolis], 4 (1912), No. 1, pp. 9, 10*).—This article gives an abstract of a law enacted by the Wisconsin legislature in 1911 providing for cooperative or ganizations among any 5 persons "for the purpose of conducting any agri cultural, dairy, mercantile, mining, manufacturing, or mechanical business on the cooperative plan."

A successful farmers' elevator, H. N. NELSON (*Nebr. Farmer, 44 (1912), No. 1, p. 3*).—This article presents the history of a farmers' cooperative elevator company in Saunders County, Nebr., organized and chartered in 1890 with a capital stock of $8,000, of which $4,000 was paid in. It is noted that after vicissitudes covering a period of 10 years the company was reorganized on a profitable basis. The business for the last 5 years has averaged $250,000 annually, and the value of the shares has greatly increased.

Marketing the cotton crop of the South, M. B. HOUGHTON (*Bul. Agr. Dept. Ala., 1911, No. 49, pp. 13*).—In discussing the present method of marketing the cotton crop of the South it is maintained that through speculative influences and combinations of capital operating through what are termed cotton ex changes the quoted market value of the product has suffered unreasonable fluctuations within very short periods of time, varying as much as 10 cts. a pound within a few months. These extreme prices are said to demoralize business and work to the detriment of producer, manufacturer, and consumer, the estimated loss in the 1911 crop up to November 1 being $150,000,000.

The plan suggested for remedying the present system of marketing "is to levy a tax of $1 a ton on fertilizers, $1 a ton on cottonseed meal and $1 a bale on cotton at the gin, and in addition, a reasonable license on all public gins and oil mills. The proceeds of these levies should be turned into the state treasury to the credit of the agricultural department as a special fund. With the money in hand backed by the state governments, the necessary legislation

could be obtained to secure bonded storage warehouses in each county and at the principal ports, lower insurance, compressing, weighing, and commission rates, and the authorized agents of the farmer could guarantee the manufacturer a regular supply at reasonable prices based on supply and demand. The fund could be used to advance to the holder at a nominal rate of interest, and any surplus from large crops could be carried over to the next. The agents of the farmer would be in position to advise as to an increase or a decrease in acreage and the advice, coming from an official and friendly source, would be heeded."

It is claimed that this tax would not be a cost to the grower but would only be collecting toll from the middle men and speculators.

A national reserve association and the movement of cotton in the South, J. L. LAUGHLIN (*Jour. Polit. Econ., 20 (1912), No. 2, pp. 135–152*).—This article discusses at length the present movement of the cotton crop and the bills of lading arising therefrom, methods of financing this movement by the banks, evils of the present system, and the remedies suggested.

In connection with the discussion it is stated that the value of unmanufactured cotton exported from the Southern States in 1910 was $450,447,234, and that under the present conditions this movement was financed mainly through New York, with an estimated gain to the money lender of several millions of dollars. The question raised is whether the southern banks might not be able to finance this movement more economically through a National Reserve Association, which would be in the form of a cooperative agency for all banks, and would enable any bank having cotton paper, accompanied by warehouse receipts or bills of lading, to obtain a rediscount at any branch of the association, thereby obviating a lack of currency during the crop-moving period, attributed largely to the inelasticity of our currency. It is held that by such a cooperative association the South would be enabled to coin its cotton into notes through its own local associations; that there would be no reason for the expensive shipment of cash to and from the great central reserve cities; that this would provide elasticity not only of notes but also of credit; that it would by evolution carry to a wider field of operation the principles of the clearing-house associations, and save the needless move of actual cash, not merely between banks in the same locality, but between different portions of the country; and that the crop-moving period then would not be a time of great shifting of money reserves and a period of stringency, but a season with increased purchasing power.

The rural population of Ohio: Where is it increasing and decreasing? Why? L. H. GODDARD (*Ohio Sta. Circ. 116, pp. 15–21, figs. 4*).—In connection with an agricultural survey now being conducted by the Ohio Station a limited study of the changes in the rural population of Ohio has been made and is here presented. The circular reproduces 4 maps which are being used in the study, which show by means of dots the percentage of increase or decrease in rural population in each rural township of the State between 1900 and 1910 as reported by the last Federal census.

It is pointed out that out of a total of 1,352 townships 70 per cent of them show a loss in rural population. This reduces the rural population of the State, as compared with the total population, from 42 per cent in 1900 to 35 per cent in 1910.

British rural life and labor, F. G. HEATH (*London, 1911, pp. XI+318*).—The author here arranges and presents considerable information, derived in fact from official sources relative to the habits, occupations, wages, systems of labor, earnings, food, dwelling, education, and many other phases of the life of rural laborers in Great Britain.

Depopulation of rural districts in Germany, P. CLERGET (*Géographie, 24 (1911), No. 1, pp. 46–49*).—It is pointed out that the proportion of persons engaged in agriculture in Germany has been steadily diminishing. In 1830 the number so engaged was 80 per cent of the total population; in 1860, 60 per cent; in 1882, 42.5 per cent; and in 1895, 35.7 per cent.

Emigration from the nation for the last 20 years has decreased, but the exodus from the rural districts to towns has steadily increased. The intensity of this depopulation is said to be due to the increase in size of the farms, or rather the larger scale upon which they are worked, larger farms meaning fewer hands per acre. It is shown that farms of from 5 to 20 hectares employ on an average 44 persons per 100 hectares, while farms from 20 to 100 hectares employ 22, and those exceeding 100 hectares only 17 persons per 100 hectares. It is argued that this is not due to the fact that more produce, economically speaking, can be obtained with less labor on large farms, but because the large estates are usually not so successful economically as the small ones. The establishment of small holdings is recommended as a means to check the exodus of the rural population.

Agriculture in the Transvaal and neighboring provinces, F. T. NICHOLSON (*Rev. Écon. Internat., 8 (1911), IV, No. 3, pp. 490–520*).—This is a discussion of the recent development of the agricultural industry in the Transvaal, the number and classes of live stock common to that section, and the various crops raised, together with a discussion of the question of a permanent supply of cheap farm labor. Tables are given showing the expenditures for farm requisites such as farm machinery, live stock, material for dipping sheep, fertilizers, etc., in British Central Africa for 1907–1910, together with acreage, yield, income, etc., of various agricultural products.

Supply and distribution of cotton for the year ended August 31, 1911 (*Bur. of the Census [U. S.] Bul. 113, 1911, pp. 31, figs. 4*).—This bulletin shows that the supply of cotton in the United States for the year ended August 31, 1911, was 13,873,423 bales, including 1,040,040 bales of stock carried over from the previous year. Other notes and tables show the distribution of cotton, together with statistics of spindles, cotton consumed, stocks, imports and exports of cotton and cotton goods, including comparative statistics for previous years, the world's spindles and consumption of cotton for 1900 and 1911, and statistics of the trade in cotton and its manufactures for selected countries. See also a previous note (E. S. R., 24, p. 539).

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 12, pp. 89–96, figs. 2*).—This report presents statistical data pertaining to the cotton crop for 1911–12; acreage and condition of winter wheat, rye, and other crops; data as to the farm value of important crops; acreage, yield, and value of specific crops; comparative price of articles purchased by farmers and quantities purchasable by value of 1 acre; together with the annual report of the Bureau of Statistics for the fiscal year 1911, including a description of the system of reporting crops.

The value of 1 acre of the farmer's crops in 1910 is estimated as about 5.8 per cent less than in 1909 but 62.7 more than in 1899, the purchasing power of the produce of 1 acre in 1910 as about 7.3 per cent less than in 1909 but about 44.1 per cent more than in 1899, and the average increase in the cost of articles purchased by farmers as about 1.5 per cent more in 1910 than in 1909.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 12, Sup., pp. 97–104*).—The report shows areas, yields, and values of important farm crops by States for 1909 to 1911, inclusive; area, yield per acre, production, and farm value of tobacco by types and districts, 1909 to 1911, inclusive;

range of prices of agricultural products at important markets; cotton production of 1911; and monthly receipts and stocks of eggs in the United States.

"The total value of the . . . corn, wheat, oats, barley, rye, buckwheat, flaxseed, rice, potatoes, hay, and tobacco, based upon prices paid to producers on December 1, in 1911 amounted to $3,769,562,000; in 1910, $3,581,844,000; and in 1909, $3,736,780,000. The index number of total production of these crops combined in 1911 was 13.6 per cent less than in 1910 and 10.4 per cent less than in 1900. The index number of average prices of these crops in 1911 was 21.8 per cent higher than in 1910 and 12.6 per cent higher than in 1909."

Foreign crops, Nov.–Dec., 1911, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 26, pp. 16*).—It is noted in this circular that the production of corn in 1911 in the United States, Argentina, Hungary, and Italy, which produce more than 86 per cent of the total yield of the world, is about 556,000,000 bu. less than in 1910 and 250,000,000 bu. less than in 1908. The exports of corn from these countries range from 50,000,000 to 100,000,000 bu. annually.

Tables are given showing the exports of corn by countries of origin and countries to which consigned; production of olives and olive oil in Spain in 1911; that the estimate of the area under cotton in British India is more than 2,000,000 acres less for 1911–12 than for 1910–11; area and production of specified crops in Algeria for 1911; in Great Britain, Germany, Bulgaria, Canada, France, and Russia for a period of years.

Amount of chief agricultural products in Japan (*Ann. Statis. Rpt. Tokyo Chamber Com., 1911, p. 170*).—Tables show the amount of the chief agricultural products in Japan for each year from 1900 to 1909 inclusive.

The yield of rice increased from 205,673,253 bu. in 1900 to 260,100,803 bu. in 1909. The yield of wheat in 1900 was equivalent to 92,967,886 bu. and in 1909 to 106,709,359 bu.

Average prices of commodities in the city of Tokyo (*Ann. Statis. Rpt. Tokyo Chamber Com., 1911, pp. 37–44*).—Tables show the average prices of agricultural products and various other commodities in Tokyo, Japan, from 1900 to 1910, with the average price of these commodities for each month in 1910.

AGRICULTURAL EDUCATION.

Memorandum on the principles and methods of rural education (*London: Bd. Ed., 1911, pp. V+48*).—This memorandum includes a comprehensive survey of that part of the agricultural education work for which the Board of Education is responsible, including county staffs and agricultural institutes, rural elementary schools, rural secondary schools, rural evening schools, farm schools, itinerant instruction in manual processes, farriery and dairying, scholarships in agricultural colleges, the supply of teachers, advisory work, and appendixes giving data by counties as to the schools in rural districts in which agriculture is taught. The desire of the board in issuing this memorandum is "again to call the attention of the county education authorities to the far-reaching importance of a well-conceived scheme of rural education in its bearing upon agriculture, and through agriculture, upon the general conditions of rural life," and "to illustrate and enforce the need for a comprehensive rather than a piecemeal treatment of the problem of rural education."

Report of the Rural Education Conference on county staffs of instructors in agricultural subjects (*London: Bd. Agr. and Fisheries and Bd. Ed., 1910, pp. 9*).—This first report of the Rural Education Conference, which was constituted in 1910 by the presidents of the boards of agriculture and fisheries and of education, deals with the question as to whether each county should

have its own staff of instructors in agriculture, horticulture, and other allied subjects or whether the services of a single staff should be made available for groups of contiguous counties, and as to the training and qualifications which such instructors should possess.

From the replies received from 38 counties to an inquiry made by the County Councils Association and from the report of the Board of Agriculture and Fisheries on the distribution of grants for 1908–9, it was found that in 14 counties agricultural instruction is conducted entirely by the county staff. In 12 counties the main work is done by the county staff, supplemented by courses provided by a central institution usually available for more than one county. In 16 counties the instruction is given mainly by the staff provided by a central institution, with additional instructors provided by the county, and in 15 counties it is provided wholly by the staff of a central institution. In 4 counties there do not appear to be definite arrangements for giving county agricultural instruction.

The conference thinks that it may be laid down as a general principle that every county should be associated, in combination with other counties, with an efficient center, or, if not in combination, should have a minimum efficient staff of its own, and also that it is desirable, in view of the difficulty of obtaining qualified teachers and organizers, to concentrate higher agricultural education, as far as possible, in a few really efficient centers. Advice is given as to how a minimum staff should be made up, how it should be supplemented by scientific investigators, analysts, and instructors in special branches of the industry, such as forestry and the economics of agriculture, and as to what should be the qualifications of the members of the staff. The conference considers it of vital importance that the agricultural staff of a county should work under a special committee or subcommittee on agricultural education. An appendix shows the staff actually provided in some typical counties of varying sizes and systems of farming.

Agricultural and related instruction in Prussia, together with agricultural statistics for 1906, 1907, and 1908, H. THIEL (*Landw. Jahrb., 39 (1910), Sup. 2, pp. XXII+786, pls. 2*).—This report contains an account of the historical development and organization of the various phases of agricultural instruction in Prussia, and detailed statements concerning the organization, faculty, income, courses of study, attendance, etc., for 1906, 1907, and 1908, of the individual agricultural education institutions of different grades in Prussia. Detailed information is also given concerning itinerant instructors, agricultural housekeeping schools, special courses for adults, rural continuation instruction, and normal schools for the training of teachers of agriculture.

Agricultural education, R. W. THORNTON (*So. African Jour. Sci., 8 (1912), No. 6, pp. 203–208*).—This is a discussion of the agricultural education problems in South Africa to-day, including (1) the education of young men who have completed their elementary education and who intend taking up farming, (2) the instruction of those who have already taken up farming, and (3) the training of those who are to teach these two classes.

The importance and organization of agricultural instruction in the German army (*Arch. Deut. Landw. Ratsv., 35 (1911), pp. 658–688*).—This comprises a detailed account by Agricultural Chancellor Maier-Bode of the extent and scope of agricultural instruction in the German army, the time devoted to it, accommodations available, cost, attendance, interest of the participants, opinions concerning the results in the various Provinces, general remarks, rules for guidance, and other data.

It is shown that in the 4 years since its initial introduction into the army, agricultural instruction has been given in nearly every garrison in the Empire.

Instruction is usually offered in the winter half-year on Saturday afternoons, and extends through from 1¼ to 1½ hours. It is given in the majority of cases in the barracks, but in some cases in agricultural winter schools. The number of lectures varies from 6 to 32, and in many Provinces the lectures are followed by discussions. In East Prussia a pamphlet containing an outline of the subject is placed in the hands of the soldiers. Demonstration material from agricultural schools, the question box, lantern slides, etc., have been successfully used. In some of the garrisons the theoretical instruction is supplemented by excursions to well-managed farms and experiment fields, the planting of trees and demonstrations in orchards, plowing, mowing, and milking contests, fertilizer tests, etc. The instruction is conducted by directors of agricultural winter schools, agricultural teachers, officials of the chambers of agriculture and other agricultural organizations, and occasionally by veterinarians, practical farmers, and army officers.

Recommendations for the work of the department in assisting the agricultural shows of Bengal, E. J. WOODHOUSE (*Dept. Agr. Bengal Recommendations, 1910, No. 2, pp. 87, pls. 10*).—The author outlines the nature of the assistance now being given by the department of agriculture to agricultural shows and suggests a scheme for greatly increasing the efficiency of this work.

The extension work of the College of Hawaii, 1908–1911, V. MACCAUGHEY (*Hawaii. Forester and Agr., 8 (1911), No. 7, pp. 197–205*).—The author gives a brief account of the establishment of the college, a synopsis of the short courses in botany, economic entomology, horticulture, soils, farm crops, plant breeding, and forestry offered in 1908, and a list of the 26 short courses offered in 1909. Movable agricultural schools were conducted in 1909 in Hilo, Hawaii, and Wailuku, Maui. Instructions in elementary botany, zoology, and nature study is given to the free kindergarten normal class, and other special courses are held from time to time. Outlines are given of correspondence courses successfully established in September, 1910, in soils and crops, plant life, poultry husbandry, domestic science, and zoology.

An outline for agricultural work in the grammar school grades, A. A. UPHAM (*New York and Chicago, 1912, pp. 22*).—The exercises and references contained in the 21 chapters into which this outline is divided have been prepared to assist teachers in the use of the author's text-book, An Introduction to Agriculture (E. S. R., 23, p. 294).

Beautifying our schools (*Richmond, Va.: Dept. Pub. Instr., 1911, pp. 17, pls. 3, figs. 12*).—In this pamphlet may be found an account of one of the main lines along which the cooperative education association is working in Virginia, viz, the beautifying of schools and school grounds.

A study of food, I, edited by MARY P. VANZILE (*Agr. Ed. [Kans. Agr. Col.], 3 [1910], No. 1, pp. 64, figs. 10*).—A pamphlet prepared for correspondence students in home economics.

Cattle and their products, A. W. NOLAN (*W. Va. School Agr., 2 (1911), No. 4, pp. 69–87, figs. 12*).—Seven lessons are given, which deal with breeds of dairy and beef cattle, dairy products, judging cattle, calves, and feeding and caring for cattle. Practical exercises, review questions, problems, score cards for dairy and beef cattle, and references to helpful literature are included.

NOTES.

Arkansas University and Station.—The college of agriculture is now offering ten correspondence courses in agriculture. Over 325 students are taking these courses, representing 67 counties of the State.

C. H. Tourgee, professor of dairy husbandry in the university and dairy husbandman in the station, is no longer connected with the institution.

Purdue University and Station.—C. E. Craig has resigned as instructor in agronomy to become agronomist in the Polytechnic School at Porto Alegre, Brazil. J. W. Wellington has resigned as assistant horticulturist to engage in practical fruit growing in Massachusetts, and has been succeeded by Joseph Oskamp.

Iowa Station.—T. J. Maney has been appointed assistant experimentalist in horticulture, and has entered upon his duties.

Maryland College.—A three-weeks' course on the breeding and care of farm live stock and dairying has been offered, beginning February 26, and a course in home economics extending from March 18 to 23.

Mississippi College and Station.—A new board of trustees has been appointed, consisting of the following: Gov. Earl Brewer and State Superintendent of Instruction J. N. Powers, of Jackson, ex officio; T. W. Carter, Calhoun City; E. M. Clark, Natchez; Robert Powell, Jackson; J. W. Cutrer, Clarksdale; T. B. Franklin, Columbus; O. F. Lawrence, Grenada; and James Gordon, Okolona. W. F. Kirkpatrick has resigned as instructor in poultry husbandry and poultryman to accept a position with the Connecticut College and Station.

Missouri University.—The college of agriculture is offering for the first time five-day courses in a limited number of localities in the State, employing two men for the work.

Nebraska University.—The department of agricultural extension has organized two correspondence courses, one in soils and the other in field and forage crops. These courses have been prepared primarily to meet the needs of high-school teachers of agriculture.

Rutgers College.—The total enrollment in the short courses this year was 128, which was much larger than at any previous session.

Oregon College.—A course in highway chemistry has been added, to give special prominence to the testing of materials and the study of surface protection of roads.

Pennsylvania College and Station.—A course in agricultural education extending over four years will be offered next year. The primary object of this course will be to prepare teachers of agriculture for secondary schools.

H. R. Fulton, associate professor of botany in the college and botanist in the station, has been appointed botanist and vegetable pathologist in the North Carolina College and Station. H. P. Baker has accepted a position at Syracuse University as dean of the State College of Forestry, established in 1911 by the New York legislature with an initial appropriation of $55,000.

Clemson College and Station.—The offices of director of the agricultural department and director of the station have been combined, and Director Harper elected to the position. W. L. English, formerly director of the Oklahoma Station, has been appointed superintendent of the division of extension work and state agent of the Farmers' Cooperative Demonstration Work in South Carolina, the entire work now being centered at the college.

Texas Station.—A conference of the various heads of substations was recently held for the purpose of systematizing the work of the institution. Particular attention was directed to the value of the project method of outlining experimental work and the need of maintaining permanent records. E. M. Johnson has been appointed superintendent of the Beaumont substation. Plans are under way for the construction of a laboratory building at Beaumont, the improvement of the grounds, and the extension of the work in rice growing, rotation trials, and poultry raising.

Utah College.—Correspondence instruction in agriculture has recently been organized as a branch of the extension division.

Vermont University and Station.—A new greenhouse has been completed at an approximate cost of $7,000. It contains a main structure, divided into a laboratory, a potting room, and an office, and three glass houses, of which one is for the use of the station.

Virginia Station.—At the session of the general assembly just closed an appropriation of $10,000 annually for the next two years was made to the station, $5,000 annually being for experiments with tobacco and crops grown in rotation with it, and $5,000 for district substations. This is an increase of $5,000 over the appropriation made to the station by the previous assembly. The substations to be established with this fund, as well as the five tobacco stations already in operation, are in the nature of itinerant experiment plats rather than permanent substations. At each point from 5 to 25 acres of land are leased for a short term of years, and when satisfactory results have been secured the work is transferred to other sections of the State and to other problems. One-half of the appropriation will be used for experiment orchards and one-half for experiments with field crops.

Virginia Truck Station.—B. D. Adams, of Red Oak, has been elected president of the State Board of Agriculture and Immigration, vice J. M. Barker, deceased, and thereby becomes an ex-officio member of the governing board of the station.

Wisconsin University.—County horse breeders' clubs are being organized among horsemen, farmers, and others interested in horse breeding. The initial club, in Dane County, has a membership of 125.

Consolidation of Agricultural Agencies in the British West Indies.—A department of agriculture has recently been organized for the islands of Trinidad and Tobago through the consolidation of the government analytical department, the experiment station at St. Clair, the botanic gardens, the government stock farms, and the River and St. Augustine estates. A board of agriculture has also been established, which will consist of the director of the department of agriculture and from ten to twenty persons representing the agricultural interests of the colony.

A similar consolidation has taken place in Jamaica, where a department of agriculture has taken over the duties of the board of agriculture, the department of public gardens and plantations, the island and agricultural chemists' department, and the control of sugar experiments. Its functions will be to carry on the experimental work, the collection of data respecting tropical agriculture, and the seed and plant introductions, while the work of popularizing results will continue to be entrusted to the agricultural society.

Agricultural Research Institutions in Great Britain.—President Runciman, of the Board of Agriculture and Fisheries, has announced the selection of four of the six research institutions in agriculture to be maintained by grants from the Development Fund. Those for the study of plant breeding and animal nutrition are to be located at Cambridge University, and the soil studies at Rothamsted. The institution for dairy research is to be attached to the University College, Reading, and maintained at an estimated cost of about $18,000 per annum. Two-thirds of this amount will be met from the Development Fund, which will also provide half the cost of the necessary buildings.

Proposed Horticultural Institution in Wales.—The County Council in Carnarvonshire has recently acquired the estate of 2,500 acres at Madryn Castle, including substantial buildings and several hundred acres of rich agricultural land. It is proposed, with the approval of the commissioners under the Development Act, to transform the castle into a residential school of practical horticulture, market gardening, and general farming. A park of 150 acres, which surrounds the castle, is to be utilized as an experimental and demonstration area, special attention being given to methods of intensive culture.

Demonstration Farms in Northern Italy.—A recent report of the British Foreign Office on the trade of Venice gives data as to the demonstration farms in the Provinces of Venetia. It is stated that all the schools of agriculture in these Provinces have adopted the plan of equipping demonstration farms. Among them is one at Gambarare of about 47 acres, small tracts of which are leased to farmers for use according to directions from the school. Other demonstration farms are maintained at the Lido, chiefly for the cultivation of horticultural crops, at Binsegana in the Province of Padua, at Conegliano in the Province of Verona, and at Sant' Osvaldo and Pozzuolo in the Province of Udine.

Demonstration Farms in Mississippi and Louisiana.—It is announced in *Breeder's Gazette* that the Illinois Central Railway is to establish 15 demonstration farms along its lines in Mississippi and Louisiana. Each farm will contain 40 acres, and will be worked by the owners under the supervision of the agricultural colleges of the respective States.

Agricultural Extension by Automobile.—An experiment in disseminating agricultural information by automobile was inaugurated at Saluda, S. C., in 1911, under the personal supervision of the state commissioner of agriculture. A force of speakers and demonstrators from state and federal sources was sent out, and in this way remote rural districts were reached with which the agricultural trains, farmers' institutes, and similar agencies have previously been unable to come into contact.

The itinerary was arranged several days in advance and published in the local papers. At the designated stops the party was met by farmers in numbers ranging from 25 to 300. The exercises were more or less informal, and often supplemented by visits to individual farms and frequent demonstrations. From two to four meetings were held daily, and a wide range of farm problems was considered. Great interest was manifested in the campaign and many beneficial results are predicted.

Farmers' Week at Lyndon Institute.—A farmers' week was recently held at Lyndon Center, Vt., under the auspices of the State Department of Agriculture and the agricultural department of Lyndon Institute. The speakers were drawn from the state institute force, the state university, the Randolph State School of Agriculture, and the Lyndon Center Agricultural School. The average attendance for each evening session was 200, and for the forenoon and afternoon sessions 175.

Fruit Growing Clubs in Kentucky.—The State Normal School at Richmond, Ky., is organizing fruit growing clubs in many counties of the eastern portion

of the State. When a club of 25 is organized and officers selected, the school sends a man with demonstration material to instruct the members in making root grafts, storing them until spring, and setting, cultivating, and protecting them through the summer.

Country School Poultry Clubs.—According to the *Oklahoma State Farmer*, the state superintendent of public instruction is advocating the formation of poultry clubs in all Oklahoma schools. Instructions have been issued as to the organization of these clubs through the initiative of the teachers. It is also held that every school district should maintain a pen of some breed, with incubators, a small poultry house and yard, and other equipment on the school grounds or at some other convenient place in the district.

Gardening by the Boy Scouts in England.—The scouts' headquarters at London has initiated garden work and awards badges to scouts who pass in the following tests before their local committee: They must dig not less than 12 sq. ft. of ground, know the names of a dozen plants in an ordinary garden, understand what is meant by pruning, grafting, and manuring, must plant and grow successfully 6 kinds of vegetables or flowers from seeds or cuttings, and must cut and make a walking stick or cut grass with a scythe under supervision.

This work may develop into a garden club in which each member takes one or more shares and is marked for attendance at garden working hours besides receiving a percentage on all his sales. A club of this kind has been formed in Macclesfield and at the end of the first year's work showed a considerable profit in the form of dividends and bonus.

Normal School Agriculture in Kansas.—The Kansas Manual Training Normal School, Pittsburg, Kansas, offers agriculture as an elective in the third year of its normal secondary courses, and also conducts a 2-year normal college course with one semester each of instruction in soils, plant husbandry, animal husbandry, farm manufactures, and agricultural bacteriology. This college course also includes zoology and botany as required subjects and biology, physics, and physiography as electives.

The institution also offers both secondary and collegiate courses in domestic science and art, the secondary course extending over four years and the collegiate course two years.

Agriculture at the North Carolina State Normal and Industrial College.—According to the *Trucker and Farmer* for January, the State Normal and Industrial College of North Carolina has organized an agricultural department. This includes particularly such work as will be useful for the women and the teachers of the State—landscape gardening, dairying, school gardening, poultry raising, etc. The college is also cooperating with this Department in its farm demonstration work, and especially in the organization of tomato clubs.

Home Study Course in Agriculture for Teachers.—The State Normal School at Madison, S. Dak., has organized four new courses which are intended to give teachers in service a knowledge of the essential facts of agriculture, and an acquaintance with practical methods of work for rural and village schools. The courses include studies in soils, farm crops, farm animals, and agricultural biology.

A New School of Agriculture.—The Chautauqua Institution has added a school of practical agriculture to its other activities. Hereafter agriculture will be taught both as a course in the regular summer schools, and in the new school where students will live on the new 110-acre farm near the institution grounds.

It is announced that the school will be equipped as rapidly as possible with pure-bred animals and improved machinery, and that suitable buildings will

be erected in the near future. Some of the buildings, notably the poultry houses, are to be constructed by the students. They will also be given an opportunity to participate in the farm operations.

Agriculture in Secondary Schools in California.—During 1911 the Imperial County Union High School, the Oxnard Union High School, the Kern County Union High School, and the Hanford High School established agricultural courses. There are at least five other high schools in which agriculture is being definitely taught as correlated or applied science, viz, those at Gardena, Glendale, Ventura, Santa Cruz, and Yreda. These schools are well distributed over the State and, together with the University Farm School at Davis and the State Polytechnic School at San Luis Obispo, form the basis of a well-organized system of secondary agricultural instruction.

Agricultural High Schools in New York.—It is reported that 17 high schools in New York have now met the requirements of the State Department of Education as to course of study, equipment, and teachers, entitling them to state aid for agriculture, home economics, and manual training, and that 23 other high schools have inaugurated agricultural work without state aid.

The state legislature of New York at its last session appropriated $50,000 for a state school of agriculture at Cobleskill, and the governor appointed a board of trustees, but as yet the school has not been organized. The State School of Agriculture at Morrisville now has an enrollment of 64, of whom 13 are girls.

A New School of Agriculture in Mexico.—A recent number of the *Boletin de la Sociedad Agricola Mexicana* announces the establishment of a new school of agriculture at San Francisco de Borja, in Lower California, by the Brothers of Christian Schools. The instruction will be theoretical and practical and will extend through four years.

Agricultural School in Morocco.—An agricultural school is to be established in Melilla, Morocco, under Spanish auspices. This school will have for its objects the disseminating of practical instruction regarding improved methods, and their demonstration upon the estate, which will be conducted as a model farm, and also on demonstration fields in adjoining sections. It is estimated that about $48,000 for buildings and equipment, and $21,000 annually for maintenance, will be required.

Farrer Research Scholarship in New South Wales.—A Farrer memorial fund of about $5,000 has been subscribed by the public for the establishment of a research scholarship, tenable for three years, at the Hawkesbury Agricultural College. This scholarship is to be offered for competition among students desiring to undertake research work on wheat growing, both in Australia and abroad.

Society for the Improvement of Spanish Agriculture.—Under the name of the Rural Spanish Society, an organization has been formed at Bilbao, Spain, for the promotion of agriculture through the fostering of agricultural education, the introduction of modern farm machinery, improved plants and seeds, commercial fertilizers, insecticides, and fungicides, and the use of improved methods of combating animal diseases.

A large tract of land with extensive buildings has been acquired near Guernica, which will be utilized for the establishment of an institute of agricultural instruction. The instruction will be for the present of an elementary nature, but will be both theoretical and practical in scope. Experimental work is also contemplated. Funds will be provided in part by the development on a commercial scale of the agricultural estate which forms a part of the property.

Conference on Agricultural Education for Dependent and Delinquent Boys.—A meeting in New York City, January 26 and 27, of principals, superintendents,

and others interested in institutions for dependent and delinquent boys, was devoted entirely to the discussion of agriculture and its place in the education of such boys. The value of agriculture in this connection was discussed by R. R. Reeder, of New York, E. K. Eyerly, of the Massachusetts Agricultural College, and William R. George, founder of the George Junior Republic. On the subject of equipment there were papers by G. F. Warren, of Cornell, K. C. Davis, of Rutgers College, and O. S. Morgan, in charge of extension teaching in agriculture at Columbia University, all of whom emphasized the importance of good equipment.

The curriculum was discussed by G. T. Powell, of New York, G. A. Hubbell, president of the Lincoln Memorial University, and others; the management of the institution farm, by Rev. Brother Barnabas, of the Lincoln Agricultural School, H. W. Geller, of the Baron de Hirsch Agricultural School, and J. H. Washburn, of the National Farm School. Cooperation with other agricultural agencies was discussed by D. J. Crosby, of this Office, R. A. Pearson, late Commissioner of Agriculture of New York, and W. D. Hurd, of the Massachusetts Agricultural College. At an evening meeting Dr. E. E. Brown, chancellor of New York University, spoke on the Corrective Influence of Agriculture, and H. B. Fullerton, director of the Long Island Railroad Experiment Station, gave an illustrated address on the Lure of the Land and Its Promise for Boys and Girls.

Throughout the discussion there was general agreement that rural locations are advantageous for such institutions and that instruction in agriculture with accompanying outdoor work is almost imperative. One great difficulty that many of the institutions encounter is that of keeping the boys long enough to give sufficient instruction in agriculture to be of permanent value.

Proposed Country Life Hall.—The Spokane Chamber of Commerce, which has taken an active interest in country life improvement, is considering the advisability of erecting country life halls as community centers in the open country. One feature suggested is the employment of a salaried secretary to be in charge of such a hall, his duties to include the collection of data as to the crop production of the district and the rendering available of information supplied by the publications of this Department, the state experiment stations, and other agencies.

New York Organization of Agricultural Teachers.—*School Agriculture* announces the recent organization of the State Association of New York Agricultural Principals and Teachers. The object of this association is to promote and improve the teaching of agriculture in the public intermediate and secondary schools. The president, F. W. Howe, has also been designated editor-in-chief of its official organ, which will be known as *The Agricultural Educator*.

Miscellaneous.—In accordance with an order of January 19, 1912, the French Minister of Agriculture has appointed a commission to make a study of the reorganization of the National Agricultural Institute and the three national schools of agriculture, including a definite statement of their aim, the coordination of their work, and the regulation of the relations which they should have with each other and with other agricultural education institutions.

The Royal Agricultural College at Cirencester has incorporated its collegiate instruction with that of the University of Bristol. Three-year degree courses in agriculture and forestry have been provided, the first year to be spent in Bristol and devoted to general science and similar subjects, and the second and third years at Cirencester. Mr. H. J. Elwes has placed a portion of his afforested land at Colesborne at the disposal of the college for research purposes.

Dr. Paul Noel, director of the agricultural-entomological laboratory of the Department of Seine-Inférieure, Route de Neufchatel, 41, Rouen, France, desires to publish a paper on the properties of the females of certain species of

insects to attract the males from long distances, and asks entomologists to inform him of facts in this connection which may have come to their notice. He will send in exchange some of his entomological publications and also a copy of the paper when printed.

Prof. Friedrich Czapek, of the University of Prague, has been appointed to the chair of plant physiology and pathology in the Imperial College of Science and Technology, London. It is announced that this chair has been recently established to meet the needs for training students to act as advisers in matters connected with agriculture, especially in England and the British Colonies.

The publication of *Milch Zeitung*, the oldest dairy journal in the world, has been merged with that of its former scientific supplement, *Milchwirtschaftliches Zentralblatt*, under the name of the latter but continuing the volume notation of the former. It is expected that the new publication will give attention to both scientific and practical phases.

H. N. Ridley has retired from the directorship of the Botanic Gardens in Singapore. With his departure the *Agricultural Bulletin of the Straits and Federated Malay States*, which has been under his direction since its establishment in its present form in 1902, has suspended publication.

The *Agricultural News Bulletin* is being published bimonthly at Madison, Wis. Its purpose is announced as to be to promote the teaching of agriculture, and it is to contain editorials, news items, and similar information which will contribute to that end.

The University of South Carolina is offering a course of 20 lectures on agriculture, in cooperation with this Department, with a view to affording opportunity for keeping its students in touch with the trend and opportunities of country life.

Nature states that Mr. Clement Stephenson has offered $25,000 to Armstrong College, Newcastle, toward a proposed building for the new agricultural department of the college for advisory work among farmers in the northeast of England.

The *Deutsche Landwirtschaftliche Presse* of January 27, 1912, contains a detailed description of the new building and equipment of the division of plant breeding of the Institute for Plant Production at the University of Breslau.

William G. R. Paterson has been appointed principal and professor of the West of Scotland Agricultural College, vice Sir R. P. Wright, now agricultural adviser to the Scottish Education Department.

The Russian Department of Agriculture has founded at the Riga Polytechnic a school for specialists in swamp reclamation.

A three-year course in agriculture, leading to a certificate, is to be given at the Colonial Practical School of Agriculture at Fort-de-France, Martinique.

The experimental farm at Ruakura, New Zealand, has established a course of practical farm training which is being attended by ten young men.

The recent death is noted, at the age of 85 years, of Lord Lister, widely known through his introduction of antiseptic methods into medicine and surgery.

Paul de Vuyst, formerly inspector-general of agriculture, has been made director-general of agriculture for Belgium.

Dr. G. Fingerling, of the Agricultural High School at Hohenheim, has been appointed director of the Royal Agricultural Experiment Station at Möckern, Saxony.

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EXPERIMENT STATION RECORD.

VOL. XXVI. ABSTRACT NUMBER. No. 6.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Some investigations in regard to the phosphorus compounds in plant seeds, especially phytin, W. VORBRODT (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. A, 1910, No. 8, pp. 414–511, pl. 1*).—The author first investigated the different methods for determining the various forms of phosphorus in plants, etc., and came to the conclusion that the best way for estimating the free (inorganic) phosphoric acid is by means of the triple precipitation method, in which the phosphoric acid is first precipitated with magnesia mixture, the precipitate dissolved in nitric acid (1 per cent), and the final ammonium phosphomolybdate compound precipitated with barium chlorid, according to Riegler's method (E. S. R., 14, p. 736). Determinations were also made of the soluble organic compounds containing phosphorus by taking the difference between the phosphoric acid extracted with 1 per cent acetic acid solution or 0.2 per cent hydrochloric acid and the total phosphoric acid in the same solution by Neumann's method. The determination of lecithin phosphoric acid is also discussed.

The determination of the phosphorus content of the proteins can be made in two ways, either by digesting the material with dilute acid to remove soluble phosphorus compounds and then determining the phosphorus in the residue, or by taking the difference between the total phosphoric acid and the phosphoric acid soluble in acetic acid and the phosphoric acid content of the lecithin. The author prefers the latter method.

The second part of the study deals with the amounts of the various kinds of phosphorus present in seeds. It was found that the most total and the least lecithin phosphorus were present in oil-bearing seeds (*Cannabis sativa* containing 1.74 per cent and *Picea excelsa* 1.57 per cent of total phosphoric acid). Cereals and leguminous seeds contained an average of about 1 per cent. Oil seeds were also usually highest in protein phosphorus.

In part 3, which considers the enzymatic decomposition of the organic phosphorus compounds, it is noted that the organic phosphorus compounds of barley and maize seeds, soluble and insoluble in 1 per cent acetic acid solution, can be decomposed by enzyms with the splitting off of inorganic phosphoric acid. The cleavage at the outset proceeds uniformly and from the curve obtained it is possible to estimate the inorganic phosphoric acid content of barley flour approximately.

The temperature has a great influence upon this process. At a little above zero there is no action, and at 48° C. or thereabouts the action is only very slight. The optimum lies at 28° C. The enzym in the barley seed is in the free state, while that in the maize seed is in the pro-state, becomes active only after germination, and is present in greatest amount in the sprouts and scutellum. The enzym was found to be soluble in 1 per cent acetic acid.

Part 4 deals with phytin, its composition, and its decomposition products. The author prepared crude phytic acid from maize flour, and from it a crystalline acid barium phytinate, which on analysis yielded the formula $C_{12}H_{26}O_{46}P_{11}Ba_7$. This does not agree with the formula for phytic acid evolved by Posternak.[a] As inosit and phosphoric acid are formed by the hydrolysis of phytic acid or its barium salt, this points to the presence of an inosit ring in phytic acid.

A preliminary note on the fatty substances in the oat kernel, R. A. BERRY (*Rpt. Brit. Assoc. Adv. Sci., 1910, p. 579*).—"Dry oat kernel was subjected to repeated 5-hour extractions with different solvents, 5 gm. in duplicate or quadruplicate being taken in each case, with the result that ether, chloroform, light boiling point petroleum ether, and carbon tetrachlorid extracted over 95 per cent, absolute alcohol 92.5 per cent, benzene 89.24 per cent, and acetone 88.9 per cent of the total extract in the first of three 5-hour extractions. The ether extractions were repeated 6 times, and the last extraction still gave an increase of 1.7 per cent. The oil from the chloroform and alcohol extract was turbid; in the rest it was clear. Invariably the second and third extractions were partly solid. In the case of chloroform it was a clear crystalline solid. The residual meal after the 30-hour ether extraction was extracted for a further 5 hours with absolute alcohol, and yielded 0.083 gm. extract; and the residual meal from the 15-hour alcohol extract yielded, with a further 5 hours' extraction with ether, 0.004 gm. extract. The former was composed mostly of lecithin. Taking the total ether extract of three 5-hour extractions as 100, the ratio for the other solvents obtained in the same way are: Petroleum ether 97.07, carbon tetrachlorid 104.24, chloroform 109.78, acetone 112.71, benzene 113.15, absolute alcohol 127.93.

"Pure dry ether, compared with ordinary ether, with a 15-hour extraction yielded the following results calculated as percentages of the dry meal: Dry meal—dry ether 9.25, ordinary ether 9.43; air-dry meal—dry ether 9.4, ordinary ether 9.72. Dry ether and dry meal yield the purer oil.

"Oat oil from the dry ether extract gives a saponification equivalent of 265, potash absorption 21.2 per cent, iodin absorption 99.9 per cent, and it contains 4 per cent of free fatty acids calculated as oleic acid. With nitrous acid a solid elaiden was formed.

"The greater part of the lead salts of the fatty acids were soluble in ether and yielded fatty acids liquid at the ordinary temperature, with a mean combining weight of 254 and iodin absorption of 106. The fatty acids from the insoluble lead salts were solid. Small amounts of unsaponifiable matter were found in all the extracts."

In regard to the **chemical composition of rice germ**, L. BERNARDINI (*Abs. in Chem. Ztg., 35 (1911), No. 48, p. 437*).—The phosphorus content of the entire rice seed was found to be 0.95 per cent, while in the embryo it was 6.2 per cent. The greater portion of the phosphorus is phytin, that is, anhydrooxydimethylene diphosphoric acid. The ash of the embryo besides containing the usual elements also contains silicic oxid, potassium, and magnesium. Silicic acid has probably a greater physiological significance than has been heretofore attributed to it.

[a] Compt. Rend. Acad. Sci. [Paris], 137 (1903), p. 439.

A great similarity between the content of nitrogenous substances and the composition of the ash in the embryo and that in the aleurone grains (layer) was noted. The magnesium oxid content of the embryo is 1.39 and of the calcium oxid 0.27 per cent.

In regard to the lipoids contained in egg yolk, C. Serono and A. Palazzi (*Abs. in Chem. Ztg., 35 (1911), No. 100, p. 917*).—An average of 1,000 hen's eggs showed 19.4 gms. of yolk, 31.62 gms. of albumin, and 7.04 gms. of shell.

The yolk was extracted with alcohol and ether. The alcoholic extract was found to consist of an acetone-soluble and insoluble portion, the latter composed in the main of oleic acid and palmitic acid-lecithin. The figures obtained in the quantitative determination of phosphorus, nitrogen, and the fatty acids were found to agree very well with those obtained for the oleic acid-lecithin. The portion soluble in acetone was found to crystallize from boiling acetone as very fine, thin, flat, doubly refracting, blue, fluorescent needles, which at the outset are colorless but when exposed to the air are quickly converted into a yellow to reddish brown, strongly acid fluid, from which cholesterol crystals separate out. The yellow coloring matter is a decomposition product of lutein, particularly the oleic acid-lutein. By saponifying the lutein with sodium alcoholate it was shown to contain cholesterol, oleic acid, and palmitic acid, and probably consists of oleic and palmitic acid esters of cholesterol. The yellow lutein shows a single absorption band between F and G. Its solution in acetone is totally decolorized by sunlight and possesses no absorption spectrum.

The ether extract of egg yolk consists almost wholly of a straw-yellow oil, which is clear at temperatures over 15° C. and has the following contents: Specific gravity at 15° 0.9115 to 0.9127, saponification number 198.85, iodin number 82.31, acetyl figure 3.82. The oil is neutral, and does not contain any volatile fatty acids, cholesterol, or organic phosphorus. It shows no absorption bands and does not effect polarized light. The fatty acids melt at from 36 to 38°, and consist of palmitin and olein. Stearic and cerotic acid could not be detected.

As the result of several determinations the following figures for the egg oil were obtained: Triolein 68.68 per cent, and tripalmitin 30.04 per cent. The fresh yolk contained the various lipoids in the following proportion: Oil 14.77 to 17.37, palmitic- and oleic acid-lecithin 11.05 to 12.09, and lutein 4.04 to 4.17 per cent.

Chemical examination of woody aster, L. C. Raiford (*Wyoming Sta. Rpt. 1911, pp. 53–61; Jour. Amer. Chem. Soc., 33 (1911), No. 7, pp. 1189–1195*).—In connection with the work already noted (E. S. R., 25, p. 385), proximate analyses, including the constituents of the ash, are reported of the roots and tops of the woody aster (*Xylorrhiza parryi*). An assay of the leaf did not indicate the presence of alkaloids. The author, however, intends to study further the alcoholic extracts.

Analysis of Zygadenus intermedius, F. W. Heyl and L. C. Raiford (*Wyoming Sta. Rpt. 1911, pp. 62–69*).—Noted from another source (E. S. R., 25, p. 683).

The oil from seeds of the ash tree, W. Bach (*Chem. Ztg., 35 (1911), No. 53, pp. 478, 479*).—The ground seeds when extracted with ether in a Soxhlet apparatus yielded 9.7 per cent of fat. With larger quantities and petroleum ether the yield was only 8 per cent. The oil was found to possess a brownish-yellow color, was very viscous, and remained cloudy at ordinary room temperature.

The constants found were as follows: Specific gravity 0.9181, saponification number 168.5, iodin number 129.5, and Reichert-Meissl number 1.68. A stringy

fluid was obtained with the Elaidin test. The freshly prepared oil had acidity of 1.71 per cent, calculated as oleic acid.

The constants for the fatty acids are also stated.

Note on almond and apricot kernel oils, R. Ross and J. Race (*Analy 36 (1911), No. 423, pp. 263–265*).—The results of analyses of authentic samp of almond and apricot kernel oils are reported.

Fixed oil of mulberry seeds, L. Prussia (*Chem. Ztg., 34 (1910), No. p. 830; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 3, pp. 139, 140*).—T seeds of the mulberry (*Morus alba*) were found to yield when extracted wi ether, 33 per cent of a thick golden-yellow fixed oil which had an agreeab taste and a faint odor, and 24 per cent on pressing. The oil was found to very soluble in boiling 95 per cent alcohol, "soluble in an equal volume absolute alcohol at 39° C., or of acetic acid at 41°; easily soluble in all f solvents. The 2 oils, A and B, had the following characters: Specific gravi at 15°, 0.926, 0.9245; refractometer reading (Zeiss) at 40°, 63.9, 63.6; ac value, 20.1, 28.2; saponification value, 190.1, 191.3; Hehner value, 94.95, 97.5 iodin value (Hübl), 140.4, 143.3; Reichert-Meissl value, 0.35, 0.1; oxygen a sorption (Livache), after 6 days 3.5, after 14 days 9.38 (A). The fatty aci from the 2 oils had the following characters: Specific gravity at 100° (base on water at 15°) 0.8566, 0.8544; melting point, 23.6 to 25, 22 to 23°; solidific tion point, 20.8 to 21.2, 19.2 to 19.6°; refractometer reading (Zeiss) at 40 57.8, 53.3; acid value, 194 (B); saponification value, 199.8 (B); iodin valu (Hübl), 144.1 (B); iodin value of liquid fatty acids (Tortelli and Ruggeri 146.5, 159.9; liquid acids, 79.4, 80.6 per cent; solid acids, 20.6, 19.4 per cent mean molecular weight of insoluble acids, 270.4, 280.9."

Essential oil of peppermint obtained by distilling the dry leaves of ordinary peppermint (Mentha piperita), J. Muraour (*Bul. Soc. Chim. France, ser., 9 (1911), No. 1, pp. 66, 67; abs. in Jour. Soc. Chem. Indus., 30 (1911 No. 3, p. 153*).—The dry leaves of ordinary peppermint (*M. piperita*), whic fall during growth, when distilled yield from 400 to 500 gm. of oil per 100 k of leaves. This oil has an odor resembling that of Japanese peppermint and density of from 0.911 to 0.913 at 15° C. Such oils have been used to adulterat French oils of peppermint, although some of the constants which are given i the original differ to quite an extent from the regular oil.

The retarding action of inorganic salts upon catalase, W. Favre (*Biochem Ztschr., 33 (1911), No. 1, pp. 32–48; abs. in Zentbl. Biochem. u. Biophys., 1 (1911), No. 23, p. 951*).—The influence of the chlorids and sulphates of sodium potassium, magnesium, copper, iron, manganese, and colloidal silver compound such as collargol, were studied.

In regard to the temperature coefficients for the decomposition of invertase H. Euler and S. Kullberg (*Ark. Kemi. Min. och Geol., 4 (1911), No. 2, Art. pp. 8, fig. 1; abs. in Wchnschr. Brau., 28 (1911), No. 8, p. 93*).—The authors in vestigated the effect of temperature upon the destruction of this enzym an the influence of certain protective substances for retarding its destruction.

It appears that invertase is but slightly protected by lactose, saccharos and all the proteins from yeast extract, so that protein substances can no always be considered protective agents for the enzyms. Levulose, on the othe hand, possesses an extraordinary protective power. Invertase from top an bottom yeast behaves identically because the various races of *Saccharomyce cerevisiæ* contain the same kind of invertase.

Influence of viscosity of the medium on enzym reactions, P. Achalme an M. Bresson (*Compt. Rend Acad. Sci. [Paris], 152 (1911), No. 20, pp. 1328 1330, figs. 2; abs. in Chem. Abs., 5 (1911), No. 15, p. 2490*).—The rate of inve

sion by yeast invertase was determined in the presence of different amounts of glycerol.

The results show that with an increase in viscosity there is a corresponding decrease in the hydrolytic process. A similar behavior was noted with emulsin, amylase, trypsin, and oxidases.

Rôle of viscosity in the variation of the action of invertase according to the concentration of saccharose, P. Achalme and M. Bresson (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 21, pp. 1420–1422, fig. 1; abs. in Chem. Abs., 5* (*1911*), *No. 15, p. 2490*).—The inverting time for 25 per cent of the original sugar (saccharose) present in solution was noted. The phenomenon was practically similar to that noted above.

Nomenclature of the sugars, E. Votoček (*Ber. Deut. Chem. Gesell., 44* (*1911*), *No. 3, pp. 360, 361; abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 581, I, p. 179*).—"The prefix epi is used to denote the new carbohydrate formed by the interchange of the H and OH groups on the α-carbon atom; thus mannose becomes epiglucose, ribose becomes epiarabinose, talose becomes epigalactose, etc. The isomeric pair are spoken of as epimerids, and the change as epimerism. The nomenclature is extended to the alcohols and acids of the carbohydrates."

Methods of analyzing the products of the sugar cane (*Bul. Assoc. Chim. Sucr. et Distill., 28* (*1911*), *No. 7, pp. 461–473, fig. 1; Internat. Sugar Jour., 13* (*1911*), *No. 145, pp. 19–25*).—This article deals with the factory methods adopted by the Association of Chemists of Hawaii for the chemical control of cane sugar making.

Examination of beet juices and similar substances according to Clerget's method, H. Pellet (*Sucr. Belge, 39* (*1911*), *p. 478; abs. in Chem. Ztg., 35* (*1911*), *No. 102, Repert., p. 428*).—The addition of 0.25 per cent of raffinose or 0.5 per cent of invert sugar does not influence the results obtained with Clerget's method, while the presence of amino acids or amins causes low results. This is particularly so if bodies of the glutamin group and much lead subacetate solution are present. If the rotation is made on the basis of 100, asparagin, asparaginic acid, glutamin and glutaminic acid in 1 per cent solutions will show −9, +9, +7, and +16° respectively; in 10 per cent lead subacetate solution +84, +18.9, −24, and −33°, and in a 10 per cent hydrochloric acid solution +46.2, +35.2, +44, and +42.2°. The differences which the Clerget method show, therefore, do not prove that dextrorotary, nondetectable losses due to nonsugar are present.

Bacteriologic studies of honeys, A. Sartory and E. Moreau (*Ann. Falsif., 4* (*1911*), *No. 31, pp. 259–263*).—Honeys from various sources were found to contain *Bacillus subtilis, B. megaterium, B. œrophilus, Sarcina lutea, Micrococcus radiatus, Staphylococcus pyogenes, Penicillium glaucum, Rhizopus nigricans, Saccharomyces cerevisiæ, Mucor racemosus, Aspergillus gracilis, Sterigmatocystes nigra*, pink yeast, etc.

Among the various micro-organisms a yellow bacillus was isolated which produced a coloring matter at an optimum of 30° C. slightly soluble in absolute alcohol. Its color was changed to a yellow-brown by the addition of alkali, but when acidified it resumed its original shade. The bacillus was placed in a class with *Bacillus luteus* and *B. flavus*.

The use of the quantitative precipitin reaction for examining honeys, J. Thöni (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 2* (*1911*), *No. 2, pp. 80–123, figs. 17; abs. in Chem. Ztg., 35* (*1911*), *No. 97, Repert., p. 405*).—The serums used were obtained by immunizing rabbits against bee bread or feed protein.

Sugars gave no precipitate, while artificial honeys in solutions of from 10 to 15 per cent strength gave slight precipitates. True bee honeys with the same serum gave definite precipitates. Field honeys gave a stronger reaction than forest honeys, and the honey from bees fed with sugar gave one less definite. Honeys undergoing fermentation gave a reaction as intense as sound honeys.

In regard to the analysis of honey, G. ARMANI and I. BARBONI (*Abs. in Chem. Ztg., 35 (1911), No. 42, p. 383*).—If to an aqueous solution of artificial honey an acetic acid solution of benzidin is added, the solution takes on a deep yellow coloration which arrives at its maximum intensity after 15 minutes. The color is retained for several days. Neither heated nor unheated natural honey gives the reaction.

Nitrites were found to give the same reaction, but according to the author it is not caused by nitrites in artificial honey.

Reaction for detecting nitrites, G. ARMANI and I. BARBONI (*Rend. Soc. Chim. Ital., 2. ser., 2 (1910), pp. 246, 247*).—This test is based on the same principle as the one noted in the abstract above.

Analyses of chocolates, cacaos, and milk chocolate (*Jour. Off. Répub. Franç., 43 (1911), No. 195, pp. 6102, 6103; Bul. Assoc. Chim. Sucr. et Distill., 29 (1911), No. 1–2, pp. 82–89*).—These are the official French methods for moisture, ash, fat, water-soluble material, sugars, matter insoluble in water, and starch. The microscopical methods are also included.

The depression of the freezing point of vinegar as a control of its composition, A. SILVERMAN (*Chem. Ztg., 35 (1911), No. 5, pp. 43, 44, fig. 1*).—After giving a detailed description of the method and the other analytical methods used in controlling the results obtained with it, the author points out that it is a good one, but that it would be to the advantage of the operator if special tables were prepared to be used in conjunction with it.

The differentiation of natural and artificial fruit ethers, A. LANDOLT (*Chem. Ztg., 35 (1911), Nos. 74, pp. 677, 678; 75, pp. 687, 688, figs. 3*).—A discussion of the methods and the results of analyses of numerous samples of various kinds.

Caution as to testing for saccharin in sweetened foods and beverages, E. COMANDUCCI (*Bol. Chim. Farm., 49 (1910), p. 791; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 579, II, p. 80*).—"When solutions of dextrose and sucrose were extracted with a mixture of equal volumes of light petroleum and ether, it was found that the residue after distilling off the ethereal liquid yielded, on heating with resorcinol and sulphuric acid and subsequently treating with alkali and water, a fluorescent solution, the production of which has been regarded as a test for saccharin. If the ethereal extract is washed with water 3 or 4 times, however, the residue obtained no longer shows this reaction, while saccharin would not be removed by such treatment."

The coloring of food products, F. MUTTELET (*Ann. Falsif., 4 (1911), No. 32, pp. 324–329*).—This gives the official French nomenclature of coloring matters which usually occur in foodstuffs, together with the chemical and physical properties of 21 coloring matters.

Artificial coloring of food materials (*Ann. Falsif., 4 (1911), No. 38, pp. 644, 645*).—A list of the artificial coloring matters which under the French law may be used in various foods and beverages.

The quantitative separation of mixtures of certain acid coal-tar dyes, W. E. MATHEWSON (*U. S. Dept. Agr., Bur. Chem. Circ. 89, pp. 7*).—"Chiefly with the object of making a quantitative separation of the colors permitted in foods (Naphthol Yellow S, Ponceau 3 R, Orange I, Amaranth, Light Green S F Yellowish, Erythrosin, and Indigo Carmin), their ratios of distribution between

dilute hydrochloric acid of different concentrations and certain immiscible solvents were determined. The data [obtained] indicate a method that gives good results in practice and is of quite general applicability. Some figures have also been obtained for other similar colors that will show where separations can be made and can also be applied for qualitative differentiations."

Determination of fat in feeding stuffs with trichlorethylen, R. NEUMANN (*Chem. Ztg. 35 (1911), No. 112, pp. 1025, 1026*).—The fat in rice-feed meal, linseed-cake meal; linseed meal, linseed cake, palm-cake meal, cotton-seed meal, ground barley, coconut cake, sunflower cake, peanut cake, brewers' grains, distillery slops, corn-germ-oil cake, soy-bean meal, and brewers' grain molasses (freed from sugar) was determined with ether and trichlorethylene for the purpose of determining the value of trichlorethylene as a solvent. The results obtained compared very well with one another.

In regard to Cornalba's rules as to the constancy of the soluble milk constituents, H. HOFT (*Milchw. Zentbl., 7 (1911), No. 8, pp. 361–363*).—The results of examining the milk from 6 cows over a long period of time are here given, and show that the constants for total soluble solid content of the serum (6 per cent) as set down by Cornalba are apparently correct (see E. S. R., 26, p. 314).

In regard to the significance and the practical value of the methods most generally used for examining milk, H. LENZEN (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 40, p. 742*).—In this article the significance and practicability of the catalase, reductase, diastase, peroxidase, leucocyte (Trommsdorff), and hemolytic (Sassenhagen) tests are considered.

In regard to determining the dirt content of milk, K. SERGER (*Pharm. Zentralhalle, 52 (1911), No. 17, pp. 449–455; abs. in Chem. Ztg., 35 (1911), No. 75, Repert., p. 309*).—Feudler and Kuhn's method gave the best results. According to the author, milk that contains more than 10 mg. of dirt per liter and has a superficial appearance of a dirty milk should be condemned.

Determination of catalase in milk, O. JÄGGI and J. THOMANN (*Schweiz. Wchnschr. Chem. u. Pharm., 49 (1911), Nos. 10, pp. 129–137; 11, pp. 145–150; abs. in Chem. Ztg., 35 (1911), No. 61, Repert., p. 257*).—The catalytic activity of milk stands in close relation to the leucocyte content. With an increase in leucocytes there is a corresponding increase in catalase. No relation seems to exist between the fat and dry substance of milk and catalase. For determining catalase the Gerber-Lobeck apparatus (E. S. R., 24, p. 213) was found to give the best results.

In regard to reduction ferments.—II, Reduction of nitrates by the perhydridase-aldehyde-water system, A. BACH (*Biochem. Ztschr., 33 (1911), No. 4, pp. 282–290; abs. in Chem. Ztg., 35 (1911), No. 106, Repert., p. 445*).—Fresh cow's milk was found to accelerate the reduction of nitrates by aldehyde in such a manner that nitrite formation is noted after from 1 to 2 minutes. Boiled milk having aldehydes and fresh milk present, but no nitrates, does not show any nitrite production. The rapidity of the reduction process and the amount of reduction increases with the aldehyde concentration. The same holds good for the nitrate concentration. Besides the reduction of nitrates a destruction of the nitrite produced also takes place, and both processes seem to increase with the temperature. The optimum temperature lies between 60 and 70° C. Acetaldehyde acts better than formaldehyde.

A reaction for differentiating woman's and cow's milk, G. TUGENDREICH (*Berlin. Klin. Wchnschr., 48 (1911), No. 5, p. 224; abs. in Chem. Ztg., 35 (1911), No. 41, Repert., p. 166*).—To 3 cc. of the milk in question an equivalent amount of 1 to 2 per cent silver nitrate solution is added, then shaken and brought to

the boiling point. The milk is then boiled 3 times. In the presence of woman's milk the mixture becomes coffee brown or brownish violet, while cow's milk takes on no coloration at all or only a very slight one.

Application of miscibility curves to the analysis of butter, margarin, etc., E. Louïse (*Ann. Falsif., 4 (1911), No. 32, pp. 302–305, figs. 2; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 15, p. 965*).—The author uses for the purpose a cylindrical bath having concentric chambers, the outer one of which is closed with the exception of 2 holes for the introduction of a thermometer and the escape of the vapors formed. In the outer chamber some lubricating oil of heavy specific gravity is placed, while the inner one is filled with ordinary petroleum oil.

The procedure is then as follows: "Ten gm. of the melted and dried fat and 10 cc. of the 'typical' petroleum oil are placed in a large test tube, which is closed with a cork through which passes a thermometer, and is placed in the inner chamber. The typical petroleum oil should be such that when 20 cc. thereof are mixed with 10 cc. of absolute alcohol the turbidity temperature is 4.9° C., and with 5 cc. of alcohol, 4°. Increasing quantities of anilin are then introduced into the tube, the turbidity temperatures determined and the miscibility curves plotted. Five cc. of the anilin should give a reading of 69° when mixed with 10 cc. of the typical petroleum oil, and 10 cc. a reading of 72°.

"All the samples of butter fat thus examined gave curves of the same form, approximating to each other and differing at the most divergent point by only 2°. Twelve samples of margarin gave curves considerably higher (about 8°), while 'vegetaline' gave curves about 4° lower than those of butter. Samples of different animal fats gave curves slightly higher than those of margarin."

Butter adulterated with acetin, N. Tarugi and D. Vernengo (*Chem. Ztg., 35 (1911), No. 116, p. 1068*).—Butter was found adulterated with acetin. It was also determined that mixtures could be easily prepared from margarin, coconut oil and acetin which would give Reichert-Meissl-Wollny and acid figures corresponding to those given by butter.

For detecting such adulterations the method proposed is as follows: Ten gm. of the butter and 50 cc. of water are brought into a flask, connected with a reflux condenser, and heated on a water bath until the fat has become fluid. During the heating process the mixture is repeatedly shaken. After cooling, 10 cc. of the aqueous solution is used for determining the Reichert-Meissl-Wollny figure according to the usual method, and the result obtained multiplied by 5. These figures are nil for margarin and coconut oil. If acetin is present the Reichert-Meissl-Wollny figure reaches 30, while the acidity figure is around 65.

In regard to Halphen's reaction, E. Gastaldi (*Abs. in Chem. Ztg., 35 (1911), No. 75, p. 688*).—Despite the fact that numerous investigations have been made with this reaction, the author points out that the function of the amyl alcohol has never been discussed (E. S. R., 25, p. 615). He finds that amyl alcohol as such plays very little part in the reaction, as the pure neutral alcohol practically free from pyridin bases gives a very faint coloration. When amyl alcohol is left out, or the alcohol is replaced by another, only a red-orange coloration is obtained and never the wine-red color. Amyl alcohol can be replaced by a drop of pyridin, anilin, chinolin, from 2 to 3 drops of ammonia, or by a concentrated solution of potassium or sodium hydrate.

If in a test tube containing 5 cc. of the oil in question, 4 cc. of a 1 per cent solution of sulphur and carbon bisulphid and 1 drop of pyridin are added and placed in a boiling water bath for from 15 minutes to 1 hour, a red coloration is obtained when 0.25 per cent of cotton-seed oil is present.

The refractive index of beeswax, L. Feldstein (*U. S. Dept. Agr., Bur. Chem. Circ. 86, pp. 3*).—As the refractive index of beeswax is always determined at some temperature above 63° C., and the results reported in reference to 40°, a temperature at which the beeswax is solid, the author sought to eliminate the calculation to 40° by setting limits for the index at some temperature above the melting point.

The results obtained with authentic samples of beeswax, some mixtures of beeswax with stearin or paraffin, or with both, show that the refractometric index of pure beeswax at a temperature of 75° lies between 1.4398 and 1.4451, while that obtained with adulterated samples in most instances falls below. The author, therefore, recommends adopting the procedure, using 75° as the observation and reporting temperature of beeswax.

Determination of citric acid, D. S. Pratt (*U. S. Dept. Agr., Bur. Chem. Circ. 88, pp. 7*).—As there has been no satisfactory method for determining citric acid in the presence of other fruit acids, the author proposes one which is also suitable for the analysis of a great variety of substances besides fruit and fruit products. This method is as follows:

"If a fruit juice is under examination, weigh 50 gm. into a beaker and add 110 cc. of 95 per cent alcohol to throw out the pectin bodies. After standing 15 minutes remove these by filtration and wash the residue with 95 per cent alcohol in which citric acid is readily soluble. Dilute the filtrate with water to give approximately a 50 per cent alcohol content and add enough 20 per cent aqueous solution of barium acetate to precipitate the barium citrate completely. Stir, let stand until the precipitate partially settles, and filter. Wash the precipitate thoroughly with 50 per cent alcohol to remove the greater part of the sugar present. This may be done by filling the paper twice with the dilute alcohol. Place the filter paper and its contents in the beaker used for the precipitation and dry until all alcohol is removed. If desired, the same result may be accomplished by washing with ether before removing the filter paper from the funnel. Add about 50 cc. of water and from 3 to 5 cc. of sirupy phosphoric acid to the beaker containing the filter paper and precipitate. Upon warming, the barium citrate is completely dissolved. This is the chief reason for the use of phosphoric acid rather than sulphuric, which would throw out barium sulphate. Filter into a 100-cc. measuring flask and make up to volume with washings from the filter paper in the beaker. This completely removes the barium citrate.

"An aliquot, estimated to contain from 0.050 to 0.150 gm. of citric acid, is measured into the distilling flask. About 5 to 10 cc. of sirupy phosphoric acid and 400 cc. of hot water are added. When briskly boiling, add potassium permanganate solution (0.5 gm. per liter), 1 to 2 drops per second, until a pink color throughout the solution shows the reaction to be complete. The distillate is received in a liter Erlenmeyer flask containing from 30 to 40 cc. of Denigès's reagent just described. The distillation is continued until about 50 to 100 cc. remain in the flask. The Erlenmeyer containing the distillate is then connected with a reflux condenser, and boiled gently for three-quarters of an hour after the solution turns milky. Filter hot through a Gooch crucible, wash with water, alcohol, and finally with ether, and dry in a water oven for half an hour. The weight of the precipitate multiplied by 0.22 gives citric acid."

Duplicate results obtained with the method generally check within from 2 to 3 mg. of citric acid. Some notes on the distilling appparatus best suited to the method are given.

A modification in the determination of malic acid, D. S. Pratt (*U. S. Dept. Agr., Bur. Chem. Circ. 87, pp. 2*).—The Dunbar and Bacon method (E. S. R., 25, p. 715) for determining malic acid presents as difficulties "the

slowness with which the various liquids filter and the great difficulty in always obtaining solutions sufficiently clear and free from small particles for polarizing. The lead salts have a tendency to pass through the filter, especially with certain types of fruit of low acidity. The chief cause of slow filtration is the presence of pectin bodies, always present in fruit juices to a greater or less extent."

The author has, therefore, modified the procedure as follows:

"A weighed amount of juice, generally 100 gm., is placed in a 500 cc. beaker. With vigorous stirring about two or three times the volume of 95 per cent alcohol is added. . . . The liquid is decanted through a filter and the precipitate washed twice with 95 per cent alcohol. The combined filtrates are then evaporated in a current of air on the water bath to about 75 cc. After cooling, the solution is made up to 100 cc. in a measuring flask, using 10 to 15 cc. of 95 per cent alcohol and distilled water. The temperature when the volume is finally made up to the mark should be close to that at which the polariscope readings are to be taken. This solution is then treated exactly as in the original method, except that no clarification is necessary. . . . In cases where the alcohol has caused some fruit color to pass into solution the addition of a tiny drop of bromin and vigorous shaking and filtering, if necessary, before reading will give satisfactory results. . . .

"Another advantage of this method of procedure is that concentration of the original juice is possible. Two hundred gm. may be used, and the final volume after evaporation made up as usual to 100 cc."

The quantitative determination of formaldehyde by the ammonia method, A. Beythien et al. (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 11, pp. 671–673*).—In view of the fact that various investigators have obtained different results with the method when using different indicators (phenolphthalein, rosolic acid, methyl orange, cochineal, litmus, and Congo red), the authors made a study of the methods, using the above-named indicators and comparing the results with those obtained by the accurate iodin method of Romijn (E. S. R., 9, p. 420).

The Smith method,[a] which uses rosolic acid, was found to yield the most accurate results, while cochineal and methyl orange came next. Phenolphthalein, litmus, and Congo red could not be employed at all.

Quantitative determination of formic acid, H. Franzen and F. Egger (*Jour. Prakt. Chem., n. ser., 83 (1911), No. 6–7, pp. 323–325; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 9, p. 572*).—This is a modification of the method proposed by Franzen and Greve (E. S. R., 23, p. 11).

The testing of creosote, C. E. Sage (*Jour. Soc. Chem. Indus., 30 (1911), No. 10, pp. 588–594, figs. 3*).—The analysis of impure substances like commercial creosote by different methods will yield varying results. The author, therefore, describes in detail methods which he recommends for the examination of cresotes intended for sheep dips, disinfectants, etc., with special reference to British conditions.

In regard to determining nicotin in tobacco extracts, J. Leister (*Chem. Ztg., 35 (1911), No. 27, pp. 239, 240*).—The high results obtained with the Ulex method are deemed probably due to an improper rubbing up of the powder, as this results in a retention of ammonia which finally finds its way over into the distillate with the nicotin. The author has utilized the method for several years with perfect satisfaction. With a sample of technically pure nicotin the following figures were obtained: Ulex method 86.7 per cent, Kissling 87 per cent, and Schloesing 91 per cent.

[a] Amer. Jour. Pharm., 70 (1898), pp. 86–94.

Tobacco extracts and their value, J. SCHRÖDER (*Ztschr. Analyt. Chem., 50 (1911), No. 7, pp. 433–435; abs. in Analyst, 36 (1911), No. 425, pp. 411, 412*).—The author believes that the best method for paying for tobacco extracts is on the basis of the nicotin content. The method employed for determining the nicotin is as follows:

"The extract (10 gm.) is mixed with so much dry sand that a dry powder results. This is slightly moistened with alcoholic potash, placed in a thimble, and extracted with ether for 5 hours. The extract is cautiously evaporated to two-thirds its bulk on the water bath. To the residue 200 cc. of 1 per cent aqueous caustic soda are added, and the mixture distilled in a current of steam until the distillate amounts to 500 cc., the residue in the flask at the end of the operation being 60 to 80 cc. The nicotin in the distillate is then estimated by titration with tenth-normal sulphuric acid."

The detection of nitrates and nitrites in water, G. DENIGÈS (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 11, pp. 544–546; abs. in Analyst, 36 (1911), No. 425, p. 432*).—The reagent (hydrostrychnin) used for detecting nitrites and nitrates in water is prepared by mixing together 5 cc. of a 1 per cent aqueous solution of strychnin, 5 cc. of hydrochloric acid (specific gravity 1.18 to 1.19), and from 4 to 5 gm. of pure granulated zinc, heating the mixture to the boiling point, leaving it for from 5 to 10 minutes at the ordinary temperature, cooling it in water, and decanting the supernatant liquid. If 0.5 cc. of this reagent is added to 10 cc. of water containing nitrites, a rose-red coloration is immediately produced. When the amount of nitrous acid does not exceed 0.1 mg., a colorimetric estimation of the amount present may be made by comparison with standard solutions of nitrites.

Nitrates can be detected only when a few drops of sulphuric acid are added to the water. When nitrates are to be determined the nitrites may be removed by evaporating 10 cc. of the water to dryness with from 3 to 4 drops of acetic acid and 2 drops of ammonia. The residue from this is taken up with 10 cc. of distilled water and tested as usual. Chlorids do not interfere with the reaction.

Determination of sulphur, G. ANELLI (*Gaz. Chim. Ital., 41 (1911), I, No. 2–3, pp. 334–341; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 9, p. 573*).—The Carius method invariably gave high results with pure sulphur. This was found to be due to the action on the glass of the sulphuric acid produced. The silica thus liberated is weighed as barium sulphate.

The author believes that accurate results can be obtained if the sulphur or sample containing it is heated with a mixture of nitric acid and barium nitrate.

The technic of precipitating with phosphotungstic acid, E. WECHSLER (*Hoppe-Seyler's Ztschr. Physiol. Chem., 73 (1911), No. 1–2, pp. 138–143*).—This work was done with albumoses (proto- and deutero-), arginin, histidin, lysin, guanidin, methyl guanidin, creatinin, phenylalanin, guanin, and adenin for the purpose of determining the behavior of the different phosphotungstic acid precipitates obtained wth them in acetone solution. From the results it is concluded that the acetone method is a good one for working up phosphotungstic acid precipitates.

Determination of chlorids, chlorates, and perchlorates in mixtures of the same, MARQUEYROL (*Ann. Chim. Analyt., 16 (1911), No. 5, pp. 167, 168; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 11, p. 682*).—The method proposed is based on the principle that hot nitric acid will completely decompose chlorids and chlorates and convert them into nitrates while perchlorates are stable.

A new form of extraction apparatus, C. K. FRANCIS (*Jour. Indus. and Engin. Chem., 3 (1911), No. 9, pp. 673, 674, figs. 3*).—The apparatus consists of

a modified condenser of the Hopkins type, an improved Knorr flask, and an extraction tube. There are no ground joints, the one seal being made with mercury. No support is necessary for the flask. The apparatus is especially applicable to extracting alkaloids and fat.

Sorghum sirup manufacture, A. H. BRYAN (*U. S. Dept. Agr., Farmers' Bul. 477, pp. 40, figs. 23*).—This bulletin, which supersedes Farmers' Bulletin 135 (E. S. R., 13, p. 595), treats of the following topics: History, varieties, culture, and harvesting of sorghum; manufacture of sorghum sirup, extraction, clarification, and evaporation or concentration of the juice, use of kettles, pans and patent evaporators, and steam evaporators; methods of determining the finishing point; treatment of the finished sirup; canning sirup; prevention of crystallization; comments by representative sirup makers; economic considerations, location and arrangement of a sirup plant; making sirup on shares; analyses of sorghum varieties; and statistics of sorghum sirup production.

The bulletin is illustrated with cuts of the machinery and apparatus required for sorghum sirup making.

The "graisse" sickness of ciders, E. KAYSER (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 21, pp. 1422–1424; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 12, pp. 762, 763*).—From ciders affected with the graisse sickness the author isolated 4 organisms, which he terms A, B, C, and D, their size being as follows: A, 3 to 16 by 1.5 to 2 microns; B, 1.5 to 4.5 by 0.75 to 1 microns; C, 1.5 by 0.75 microns; D, 1.5 to 4 by 1 to 1.5 microns.

"The organisms generally form chains, which are straight in the case of A, curved in the case of B and D, while those formed by C are convoluted. They are somewhat anaerobic and have a temperature optimum of about 30° C. They grow readily in solutions of sugar in bean decoction, yeast water, extract of malt combs, or peptonized meat extract. The organism A has no visible effect on milk but produces a pleasant odor of apple essence; B coagulates milk partially; C renders it ropy and coagulates it, and D renders it ropy but does not coagulate it. Of the sugars, sucrose, dextrose, and levulose, the organism B exhibits a preference for levulose while C prefers dextrose. A concentration of 15 to 20 per cent of sucrose does not prevent the production of ropiness, and all the organisms can produce ropiness in the presence of 4 to 5 per cent of alcohol. Addition of dead yeast, humus, or tannin (even to the extent of 0.1 per cent) to the culture medium, produces very vigorous and ropy growths, especially in the case of the organisms A and C. The production of ropiness in ciders depends not merely on the presence of one of these organisms but is influenced by other factors as well; ciders which have been completely fermented do not become ropy."

Viticulture and cellar operations in wine manufacture.—Cellar operations, A. F. VON BABO and E. MACH (*Handbuch des Weinbaues und der Kellerwirtschaft. 2. Band, Kellerwirtschaft. Berlin, 1910, vol. 2, 4. ed., pp. XX+1102, figs. 322*).—This is volume 2 of this work, which has been revised by J. Wortmann, and deals with the chemistry of the grape and wine, wine cellars, storage vats, general cellar operations, the preparation of white, red, and bottled wines, etc., the selling and shipping of wines and musts, the chemical analysis of wines, diseases of wine, the utilization of the by-products, and the various existing laws in regard to the manufacture and sale of wines.

The use of sugar beets for the production of alcohol, K. ANTAL (*Ztschr. Spiritusindus., 34 (1911), Nos. 19, pp. 239, 240; 20, pp. 252, 253; abs. in Chem. Ztg., 35 (1911), No. 91, Repert., p. 386*).—A detailed statement in regard to the methods employed and similar details as to producing alcohol. The alcohol production for 4 months was 89.1 per cent of the theoretical yield.

The drying of copra, A. Dommes (*Tropenpflanzer, 14 (1910), No. 6, pp. 288–297, fig. 1; abs. in Trop. and Mag. Ceylon Agr. Soc., 35 (1910), No. 5, p. 182; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 182*).—In view of the fact that drying copra in the sun is unsatisfactory, the author recommends artificial heat for this purpose. The drying should be begun as soon as the nuts are opened, and the whole process ought to be finished in 24 hours. In order to avoid discoloration and spoilage by mold, a fairly high temperature should be used in the first stages of drying (60 to 70° C. or higher). "When the outer moisture has disappeared and the pulp is a little dried, the temperature may be lowered to 50°, but not below, and this temperature must be maintained till the copra is at least half dry. To remove the last moisture the temperature must be once more raised and the copra must be cooled in an airy room."

Method for extracting turpentine, De Lapasse (*Jour. Parfum. et Savonn., 23 (1910), p. 76; abs. in Semiann. Rpt. Schimmel and Co., 1910, Oct., pp. 133, 134; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 1, p. 129*).—A comparison between the methods used in the United States and France.

METEOROLOGY—WATER.

Agricultural meteorology and weather forecasting, P. Klein (*Météorologie Agricole et Prévision du Temps. Paris, 1911, pp. 528, figs. 147*).—This is one of the volumes of the Encyclopédie Agricole published under the direction of G. Wery. It is in the main a general treatise on meteorology and forecasting, with final chapters dealing with the relation of meteorological phenomena to plant and animal life. The effects of such meteorological elements as temperature of the air and soil, precipitation, hail, and lightning are considered individually and also collectively as climate. Climates are classified with reference to localities and special crops.

Weather wisdom in agriculture, W. R. Dunlop (*London, [1911], pp. 48, figs. 9*).—Different chapters of this book treat briefly and in popular way of the value of weather knowledge from an agricultural standpoint, and especially with reference to selection of land, planning of the farm operations, and protection from frost and other unfavorable conditions. Others describe weather conditions of the British Isles, clouds, and characteristic types of weather, meteorological instruments, and prognostications.

Temperature departures, monthly and annual, in the United States, January, 1873, to June, 1909, inclusive (*U. S. Dept. Agr., Weather Bur. Bul. U, pp. 5, pls. 146*).—This volume consists of a series of charts prepared in continuation of the policy of the Weather Bureau to reduce the meteorological observations of the United States to a homogenous series, both as to hours of observation and period of time covered, as has already been done with atmospheric pressure, temperature, vapor pressure, and precipitation.

There is one chart for each month and one for each annual, making a total of 474 separate charts. The lines traced on these charts were determined from the normals of temperature published in Bulletin S (E. S. R., 21, p. 525), computed for the 33-year period, 1873 to 1905, and comprising the independent records from more than 100 stations well distributed over the entire United States.

"The principal value of these charts will doubtless be found in the opportunities they afford for reducing the short records of temperature for the cooperative stations of the Bureau, several thousand in number, to the homogenous 33-year period adopted for the regular stations. The method of their

use for such reductions is fully set forth by Prof. F. H. Bigelow" (E. S. R., 23, p. 419).

Meteorological summaries for the year 1909 (*Kentucky Sta. Rpt. 1909, pp. 427–430*).—Summaries of observations at the State University, Lexington, on pressure, temperature, precipitation, cloudiness, wind movement, and number of thunderstorms, snows, hail, and fog are reported.

Meteorological summary for the year 1910 (*Wyoming Sta. Rpt. 1911, pp. 84–91*).—Tables are given which summarize observations during 20 years on air temperature and precipitation and during 1910 on temperature, pressure, precipitation, humidity, sunshine and cloudiness, and solar radiation, at Laramie, Wyo. A record of soil temperature at depths of 6, 12, 36, and 72 in. during 1906 to 1910 is also given.

The mean temperature of the air during 1910 was 43.8° F., the maximum, 89°, July 14, and the minimum, —14°, February 14. The average barometric pressure was 23.089 in. The total precipitation was 10.45 in., while the average temperature for the year was 3.6° above normal and for the growing season slightly above normal. Crops were injured by frequent summer frosts, namely, on May 2 and 3, June 4 and 9, and August 25. The precipitation for the year was about normal.

Frost and temperature conditions in the cranberry marshes of Wisconsin, H. J. Cox (*U. S. Dept. Agr., Weather Bur. Bul. T, pp. 121, figs. 31*).—A comparison is made of cultural and meteorological conditions in Massachusetts, New Jersey, and Wisconsin where cranberries are grown, and investigations which were made during the years 1906 to 1909 at Cranmoor, Mather, Berlin, and Cameron in the Wisconsin cranberry growing region are reported.

These investigations included observations on the general meteorological conditions prevailing in the cranberry bogs and adjacent uplands and studies of the effect of sanding, draining, flooding, and cultivating the bogs on the temperature conditions both of the soil and of the air above the bogs. The results show clearly that sanding, draining, and cultivating the bogs materially modify low night air temperatures, but it is explained that the Wisconsin cranberry growers do not sand their marshes because of the expense involved and the belief that cranberries of better quality are grown without sanding.

From a study of the general and local conditions necessary for frost in the marshes the conclusion was reached that "ordinarily areas of high barometer do not bring frosts to the cranberry marshes of Wisconsin in the midsummer months, even though they are of considerable magnitude, have comparatively low temperature, and move across the northern tier of States. . . . Should the maximum temperature in the shelter be below 70° on any day, and be followed at night by clear sky and light wind, barometer above normal and rising, there is strong probability that frost will follow in the bogs, especially if the pressure reaches a height of 30.20 in. or more and the center of the high passes over Wisconsin or the Lake Superior region. . . . The relation between the temperature of the soil and the occurrence of frost is noticeable in that it is practically impossible for frost to occur in the bogs on the first cool night following a warm spell, but it is likely, if conditions are favorable, on the second night after the soil has become cold. . . . The soil being cold in the spring and early summer, and again in the fall, frost is more likely to occur then, regardless of the accompanying conditions of atmospheric temperature and pressure. That is, the ground being cold, frost will occur in the marshes in May and early in June under the influence of areas of high pressure and accompanying low temperature that would be far from sufficient to cause frost during the midsummer months, when heat has been stored up in the soil. The length of the nights is also very important in estimating the probability of the

occurrence of frost, especially during the months of September and October, as the nights steadily grow longer and afford greater opportunity for radiation, without compensating insolation." Attention is called to the fact that danger from injury by frost decreases with the approach to maturity and that fully matured fruit can not be damaged except by a severe frost. The forecaster "should realize that he must carry on this work to a successful conclusion from the beginning to the end of the season, or, in other words, that he must 'save the crop.'"

The ammonia in rain and snow at observation stations of the Charcot expedition, A. MÜNTZ and E. LAINÉ (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 17, pp. 749, 750*).—Analyses of 4 samples of rain and 14 of snow collected at different places in the South Polar region showed for rain, a maximum of 9.82 mg. of ammonia per liter, a minimum of 0.25 mg., and a mean of 3.12 mg.; for snow, a maximum of 1.52 mg., a minimum of 0.15 mg., and a mean of 0.42 mg. The maximum for rain is considered abnormal. If this figure is excluded, the mean for rain is 0.89 mg., which is very close to that observed at Rothamsted, namely, 0.97 mg. Müntz and Aubin found from 0.06 to 0.14 mg. of ammonia in snow and from 0.12 to 0.64 mg. in rain from the Pic du Midi. These results indicate that the distribution of ammonia in rain and snow of the South Polar region is similar to that of Europe.

Hail insurance in certain countries and its problems (*Inst. Internat. Agr. [Rome], Assemblée Gén., 3. Sess., Raps. et Études Bur. Inst. Econ. et Soc., 2 (1911), pp. X+110*).—This report deals in some detail with the need of an international understanding with reference to hail insurance, and the organization of such insurance in different countries, including Germany, Austria, France, Hungary, Italy, and Switzerland; indicates the general lines on which such insurance should be organized; and points out the necessity for the systematic collection of further statistics on the frequency and injury caused by hail. It is thought that hail insurance is the most practical, economical, and rational method of dealing, either in part or in whole, with injury caused by hail, that agricultural organizations should encourage it, and states should perfect legislation with this end in view.

Surface water supply of the Missouri River basin, 1909, W. A. LAMB, W. B. FREEMAN, and F. F. HENSHAW (*U. S. Geol. Survey, Water-Supply Paper 266, pp. 291, pls. 5, fig. 1*).—This paper describes the Missouri River basin, and gives results of measurements of flow of streams in the basin, including gage height record, current meter measurements, and daily and monthly discharges.

Analyses of mineral waters, S. D. AVERITT and O. M. SHEDD (*Kentucky Sta. Rpt. 1909, pp. 411–426*).—Partial analyses of miscellaneous samples from different parts of the State are reported.

Recent methods of sewage clarification and sludge treatment in Germany, E. KUICHLING (*Engin. News, 66 (1911), No. 26, pp. 768–770*).—This article deals more particularly with the system of sewage purification installed by the city engineer of Elberfeld, Germany, comparing its operation with that of the Imhoff tank system (E. S. R., 24, p. 418).

In contrast to the Imhoff system shallow tanks are used in the Elberfeld system and the sludge, containing from 71 to 78 per cent of moisture, is removed at frequent intervals. It is stated that some of this wet sludge is used as a fertilizer by farmers, but that better results are obtained with the more thoroughly decomposed sludge obtained by spreading the wet sludge on the surface of the soil where it is allowed to remain until it becomes a compact, earthy mass containing, according to analyses reported, 0.49 per cent of nitrogen.

[Sewage disposal in Glasgow], J. N. McCunn (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 37, pp. 659, 660*).—It is stated that the Glasgow sewage is treated by chemical precipitation, the clarified effluent being discharged into the River Clyde and the sludge pressed and sold direct or after drying to farmers as a manure.

The sludge cake direct from the filter presses contains about 68 per cent of water. The wet cake contains, according to analyses reported, 0.52 per cent of nitrogen and 0.54 per cent of phosphoric acid and is valued at $1.68 per ton. The dried cake contains 1.34 per cent of nitrogen and 1.39 per cent of phosphoric acid and is valued at $4.29 per ton.

SOILS—FERTILIZERS.

Soil and climate of very small areas, G. Kraus (*Boden und Klima auf Kleinstem Raum. Jena, 1911, pp. VI+184, pls. 8, figs. 5*).—This is an account of a detailed study, extending over 11 years, of the relationships of soil, climate, and plant growth in the region of Karlstadt in the Main Valley, the soils of which are derived from a calcareous triassic formation. The work recorded included examinations of the chemical and physical character of the soil and of the parent rocks from which it was derived, the origin, formation, general character, slope, water content, and temperature of the soil, and especially the relation between the physical properties and slope of the soil and the meteorological conditions immediately above it.

The more general result of these investigations was to show the variable character of the soil and of the meteorological conditions above it within very small areas. It was found that the calcium carbonate varied widely not only in closely adjacent areas but also at different depths in the soil, and that there was no uniform and constant relation between the calcium carbonate content of the parent rock and that of the resultant soil, the proportion of carbonate being dependent mainly upon the stage of soil weathering.

A study of the distribution of vegetation with reference to the lime content of the soil showed that many plants generally considered to be lime-loving grew well in soils very poor in lime and vice versa. Most of the plants were able to live and to reproduce in all of the soils, although the lime content varied in different soils from 1 to 60 per cent. Most of the so-called lime tolerant plants were xerophytes, and hence their distribution was dependent mainly upon the moisture content of the soil.

It was found that the water content of the soils and of the plants growing upon them varied considerably within very small areas and was not always proportional to the amount of fine earth present, although the water capacity and content of the soils appeared to depend upon their physical structure, and this in turn had a marked influence upon the soil temperature. The natural vegetation depended more upon the fine earth and the water content of the soil than upon its chemical composition. With equal fineness, the water content was three times as great on a northern exposure as on a southern slope. Soils covered with leaves or grass contained, however, half as much more water as bare soils. This is ascribed to the action of the cover in reducing the effect of the wind.

The temperature and moisture of the air of a given area appeared to depend largely upon the temperature of the soil. The soil temperature was not dependent upon the air temperature, but upon the amount of solar heat absorbed by the surface soil, and this was in inverse proportion to the fine earth and water content of the soil. As a rule the temperature of the soil was lower in winter and higher during the growing period than that of the air. The fact

that the temperature of the soil is constantly and generally higher than that of the air during the growing period, and thus warms the lower layers of the air in which the plants grow, is considered to be of greater importance than is generally recognized. This heating of the lower layers of the air by the soil amounted to from 0.1 to 5° C. in the shade to 8° in the sun. During the winter, however, the conditions were reversed. In summer the temperature of the surface soil subjected to sunlight was from 12 to 19° higher than that of the air. At a depth of 0.1 meter this difference did not exceed from 3 to 5°. As a mean of 65 observations of the temperature of the soil at a depth of 0.03 meter, the southern exposures showed a temperature of 12.4° and the northern exposures 7.9°. The difference in winter was very small, rarely exceeding 2°. In summer it may be as much as 20°. Variations in soil temperature were somewhat smaller on a northern exposure than on a southern exposure. As between southwestern and northeastern exposures there was very little difference. At 2 stations near together, one in the shade and the other in the sun, the difference in temperature was 12.4° in June and 6° in March. At a depth of 0.1 meter the differences were insignificant. In bare soil the temperature was from 2 to 7° higher than in soil covered with trees or other vegetation. A certain increase of temperature ascribed to the physiological activity of plants was observed. In one case in which the general air temperature was 18.1°, temperatures of 18.2° over grass land at a height of from 2 to 3 cm., and 23.7° in air surrounding cultivated plants in the flowering stage were observed. In some cases the wind reversed the differences in temperature resulting from the nature of the soil, the plant cover, and exposure as a result of its effect on evaporation.

Among the more general conclusions, therefore, of these investigations is that each spot of soil area has a distinct and independent set of conditions and activities, which are determined primarily by the physical properties, especially the structure of the soil. In other words, the moisture and temperature conditions and to a large extent the plant growth of a given area are, especially in case of wild soils, a function of the soil structure, although, as already indicated, the wind may become an important factor in reversing conditions brought about by the soil structure.

An appendix to the report gives a blooming calendar, detailed observations on humidity of the air and wind movement, and a short bibliography of the subject.

The data of geochemistry, F. W. Clarke (*U. S. Geol. Survey Bul. 491, pp. 782*).—This is a revised and enlarged second edition of a bulletin which appeared first in 1908 (E. S. R., 20, p. 609). It is described as "a manual of geologic chemistry, including chapters on the nature, distribution, and relative abundance of the chemical elements, the composition of the atmosphere and of volcanic gases and sublimates, the mineral content of surface and underground waters, the nature of saline residues, the molten magma of the earth's interior, the rock-forming minerals, the composition of igneous, sedimentary, and metamorphic rocks, rock metamorphism and decomposition, metallic ores, natural hydrocarbons, coal, lignite, and peat." Numerous references are given to the literature from which the data are drawn.

Soils of the Eastern United States and their use, XXVI–XXVIII, J. A. Bonsteel (*U. S. Dept. Agr., Bur. Soils Circs. 49, pp. 11; 50, pp. 14; 51, pp. 11*).—These circulars deal respectively with the following soil types, as surveyed and mapped by the Bureau of Soils:

Circular 49.—The Houston clay, of which a total of 763,688 acres in 21 areas in 4 States has been surveyed and mapped by the Bureau of Soils.

"The surface soil to a variable depth is a brown or black granular clay loam or clay. This is underlain by a lighter brown or yellow plastic clay subsoil

to an average depth of about 20 in., where the gray or whitish chalk or rotten limestone is usually encountered. . . . The drainage of the type is usually fairly well established, although upon the more level areas the internal drainage of the subsoil may be defective. Erosion is one of the principal difficulties experienced in the occupation of this land, and slopes in excess of 10° should be covered with grass for pasturage purposes." This soil type is stated to constitute one of the best alfalfa soils in the upland portion of the Gulf States. It is also an important cotton soil, and fairly well adapted to the production of corn, oats, and hay.

Circular 50.—The Houston black clay, of which a total of 1,402,392 acres in 15 different areas in 3 States has been surveyed and mapped. This soil type is stated to be probably the best and most productive of the extensive upland cotton soils of the Southern States. It is also an excellent corn soil and fairly well adapted to wheat, oats, and hay. "More recently alfalfa has been grown upon the Houston black clay and the better drained areas of the type are well suited to this crop."

Circular 51.—The Susquehanna fine sandy loam, of which a total of 1,686,528 acres in 27 different areas in 5 States has been surveyed and mapped. This soil type is stated to occur to a considerable extent in Alabama and adjoining States, but chiefly in northern Louisiana and eastern Texas. It occupies rolling to hilly areas, and is subject to severe erosion. Cotton and corn are the principal crops grown on it. Its improvement requires protection from erosion, deeper plowing, and incorporation of organic matter.

Clay County soils, C. G. Hopkins et al. (*Illinois Sta. Soil Rpt. 1, pp. 32, pls. 2, figs. 2*).—This is the first of a series of Illinois County soil reports and deals with a county which is representative of the common clay soils of southern Illinois. It is the purpose to make these reports so complete for each county that "a study of the soil map and the tabular statements concerning crop requirements, the plant food content of the different soil types, and the actual results secured from definite field trials with different methods or systems of soil improvement, and a careful study of the discussion of general principles and of the descriptions of individual soil types" which are given in each report "will furnish the most necessary and useful information for the practical improvement and permanent preservation of the productive power of every kind of soil on every farm in the county."

The prevailing soil types of the county are gray silt loam on tight clay (37 per cent) and yellow silt loam, but there are smaller areas of a number of other types. It is shown that as a rule the soils of Clay County are deficient in nitrogen and phosphoric acid but abundantly supplied with potash. A system of cropping and fertilizing (including use of ground limestone and phosphates and green manures) to correct this condition is described.

Moultrie County soils, C. G. Hopkins et al. (*Illinois Sta. Soil Rpt. 2, pp. 40, pl. 1, figs. 8*).—This is the second of a series of Illinois County soil reports, and gives the results of a soil survey with a soil map of Moultrie County, which is representative of the prairie lands of the corn belt. The soil formation and types of the region are described, and estimates, from chemical analyses, of the plant food content per acre of the soils are given, with a compilation of data on fertilizer requirements as determined by experiments on similar soil types in other parts of the State.

"The most significant fact revealed by the investigation of Moultrie County soils is the low phosphorus content of the common brown silt loam prairie, a type of soil which covers more than three-fourths of the entire county. The market value of this land is about $200 an acre, and yet an application of $30 worth of fine-ground raw rock phosphate would double the phosphorus content

of the plowed soil. Such an application properly made would also double the yield of clover in the near future; and, if the clover were then returned to the soil either directly or in farm manure, the combined effect of the phosphorus and nitrogenous organic matter with a good rotation of crops would soon double the yield of corn on most farms."

An appendix contains a discussion of soil survey methods and of the general principles of soil fertility and its maintenance.

A geological and agronomical study of the oolitic deposits of the Department of Yonne, C. BRIOUX (*Ann. Inst. Nat. Agron., 2. ser., 10 (1911), Nos. 1, pp. 149–242, figs. 8; 2, pp. 243–319*).—This article reports in detail the results of a study of the physical and chemical characteristics, crop adaptations, and fertilizer requirements of the soils derived from the geological formations of the region. Statistics on the extent of production of the principal crops in 1850 and in 1898 are also given and discussed with regard to the economic factors which have influenced the acreage of the more important crops, particularly that of the grape. A bibliography of the literature of the subject is added.

The determination of colloids in cultivated soils, J. KÖNIG, J. HASENBÄUMER, and C. HASSLER (*Landw. Vers. Stat., 75 (1911), No. 5–6, pp. 377–441, fig. 1; abs. in Chem. Abs., 6 (1912), No. 3, p. 402; Jour. Soc. Chem. Indus., 31 (1912), No. 2, p. 83*).—In continuation of previous investigations (E. S. R., 19, p. 718; 20, p. 713; 24, pp. 521, 522) the authors report tests of the colorimetric method of determining soil colloids; determinations of colloids by absorption of salts; determination of absorbed and adsorbed ions in soils when dried at 200° C., treated with steam, oxidized with hydrogen peroxid, and treated with a strong, constant electric current; and a study of the relation between yield and the results of chemical and physical investigation of the soil.

The general conclusions, briefly stated, are that soils contain important amounts of substances of a more or less colloidal character which can be determined by their absorptive power for certain coloring matters and mineral salts. Methyl violet seems best adapted to colorimetric determination of colloids, and in most cases three concentrations, namely, 1, 2, and 3 gm. per liter, will suffice. The absorption of the coloring matter depends primarily upon the content of colloidal clay substances in the soil.

For determination of colloids by means of absorption of salts a fiftieth-normal solution of dipotassium phosphate is recommended. In this case the potash is absorbed mainly by the colloidal clay, and the phosphoric acid by the lime, iron oxid, and especially alumina. The potash is loosely combined in soil colloids and can be to a large extent or entirely set free by steaming, by oxidation with hydrogen peroxid, and by the action of an electric current. The phosphoric acid is combined in the form of insoluble calcium phosphate. It is more firmly fixed by heating, and can not again be entirely set free even by strong action of the electric current.

The relation between the yield and the absorptive capacity for coloring matter and dipotassium phosphate was quite close for surface soil and subsoil of the same soil type, but not for different kinds of soil.

A new method proposed in this article for the determination of the easily soluble matter in soils is treatment with a strong, constant electric current. Advantage is taken in this method of the fact that when such a current is passed through a wet soil between platinum electrodes the soil acts more or less (depending upon the colloid content) as a semipermeable membrane, with the result that a certain amount of electrolysis takes place with separation of the soil constituents at the electrodes. The apparatus and method employed are in brief as follows:

A glass cylinder with a parchment bottom is suspended in a second and larger glass cylinder. One platinum electrode (cathode) is placed above and the other (anode) below the parchment membrane, with the soil between them in the small cylinder. The soil is first well mixed with distilled water and then washed into the small cylinder, in which the water level is brought to a height of 4 cm. above the soil and to the same level in the larger cylinder. The current is so regulated as not to exceed a strength of 3 amperes, and is allowed to flow until the water reaches a temperature of 50° C. The effect of the current is to produce an inward flow of the alkaline solution to the cathode, with accompanying precipitation of the colloid substances. The humus acids pass through the parchment membrane to the anode and there form a brown colored solution. In this way a separation of alkaline and acid solutions is effected, and these may be drawn off, fresh water added, and the operation repeated until there is no further action by the current. It was found, however, that one treatment with the electric current gave amounts of soluble material, especially potash, closely agreeing with those obtained by treatment with steam or oxidation by hydrogen peroxid, and is believed to furnish a reliable method of determining the easily soluble plant food in soils.

Only in case of potash was there close agreement between the amounts of mineral matter taken up by plants and that yielded by the three methods of solution. The amounts of potash yielded by oxidation and by treatment with steam were almost identical with those taken up by the plant in all of the soils tested. The single electrical treatment gave results slightly higher than the other two methods. When the electrical treatment was continued until no further action was produced twice as much potash was dissolved as when the soil was subjected to the single electrical treatment.

In case of phosphoric acid the relations between amounts dissolved and taken up by crops were not very close. In general, treatment with steam and a single treatment with the electric current yielded 2 to 5 times the amount assimilated by plants. In case of lime the relationships were still more indefinite.

The treatment of soils with a strong constant electric current, J. KÖNIG, J. HASENBÄUMER, and C. HASSLER (*Ztschr. Angew. Chem., 24 (1911), No. 49, pp. 2341–2348, fig. 1; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 2, p. 83*).—An account of these investigations is included in the article noted above.

Bacteria of frozen soil, II, H. J. CONN (*Centbl. Bakt. [etc.], 2. Abt., 32 (1911), No. 3–5, pp. 70–97, figs. 7*).—Further investigations on this subject confirm the conclusions of a previous article (E. S. R., 24, p. 529) that bacteria actually multiply in frozen soil. The increase during the winter was, however, almost wholly in one group, many of the most vigorous summer bacteria disappearing during the cold weather.

The results indicate that the increase in frozen soil is due not to the favoring influence of cold weather, but to its repressing effect on the rivals of that group of bacteria which is capable, when unhindered, of making the greatest growth.

The present status of soil inoculation, K. F. KELLERMAN (*Abs. in Science, n. ser., 35 (1912), No. 893, pp. 228, 229*).—The following is an abstract of a paper presented at the Washington meeting of the Society of American Bacteriologists in December, 1911:

"The method of pure-culture inoculation is less certain than the use of soil from old well-inoculated fields, but has, however, the advantage of cheapness and greater ease of transportation and application, as well as the important advantage of the absence of introducing weeds and plant diseases. . . .

"Reports received from farmers who have conducted inoculation tests with cultures distributed by the Department of Agriculture during the past 7 years give an average of 76 per cent success and 24 per cent failure, if only those reports are considered that make possible some determination regarding the action of cultures. If previously inoculated fields, crop failures, and such other doubtful cases are included with the failures the percentage of success for this same period is reduced to 38.

"The organism producing nitrogen-fixing nodules on the roots of legumes has been isolated and cultivated since 1903; di Rossi's contention that the proper organism had not been isolated prior to his work in 1907 appears without foundation.

"By a new technique it has been possible to stain the flagella of this organism. Instead of bearing a single polar flagellum it is supplied with several peritrichic flagella. The proper designation of the organism, therefore, is *Bacillus radicicola*."

Azotogen, nitragin, or inoculated soil? H. von Feilitzen (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 3, pp. 211–227, figs. 10*).—The substance of this article has been noted elsewhere (E. S. R., 25, p. 123).

Bacteriological studies of the fixation of nitrogen in certain Colorado soils, W. G. Sackett (*Abs. in Science, n. ser., 35 (1912), No. 893, p. 228*).—The paper of which this is an abstract is published in full in Bulletin 179 of the Colorado Station (E. S. R., 25, p. 815).

A study of the assimilation of the mineral matter of the soil by plants (*Bul. Sta. Agron. Somme, 1910–11, pp. 37–42. figs. 3*).—In pot experiments with colza grown in various combinations of sand and loam soil it was found that the largest yield was obtained in the pot containing pure sand above and increasing proportions of loam from the top downward. All of the plants which were started in sand produced longer and more numerous fruits than those started in soil. In the pot which was filled with equal amounts of sand and soil, separated vertically, the smallest plant was produced in the sand, the largest in the soil, while the plant growing midway between the two was of medium size. The author is of the opinion that this indicates that the growth of plants is largely dependent upon the action of the roots upon the soil in which it grows and not upon the composition and concentration of the soil solution, since he thinks it reasonable to suppose that during the 3 months of the experiment referred to the soil solution should have become uniformly distributed throughout the pot and contributed as freely to the nourishment of the plant in the sand as of that in the soil half of the pot.

Fertility and fertilizer hints, J. E. Halligan (*Easton, Pa., and London, 1911, pp. VII+155, figs. 12*).—This is an abridgment of a larger book by the chemist of the Louisiana State Station entitled Soil Fertility and Fertilizers. The book is intended for the use of farmers, students, and general readers. It discusses principles and maintenance of soil fertility, farm manures, lime, gypsum and green manures, commercial fertilizers, and the home mixing of fertilizers, and gives advice regarding the purchase of fertilizers. References are given to the other work of which this is an abridgment for fuller information on many of the topics discussed.

How the scientific farmer fertilizes his soil, W. H. Beal (*Sci. Amer., 106 (1912), No. 6, pp. 130, 131, figs. 5*).—The more important scientific principles underlying the efficient use of fertilizers are briefly discussed in the light of recent investigations on the subject.

Water and fertilizing, Gerlach (*Illus. Landw. Ztg., 31 (1911), Nos. 96, pp. 889, 890; 97, pp. 896, 897*).—Experiments are reported which show that the use

of fertilizers was profitable on light soils even in dry seasons, but that irrigation increased their action in such seasons.

The loss of nitrogen from thin layers of manure on the soil, J. JÄNNES (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1911, No. 20, pp. 5–69, figs. 3*).—An account of investigations already noted from another source (E. S. R., 25, p. 826).

The action of increasing amounts of mineral fertilizers with and without addition of stable manure, A. EINECKE (*Landw. Jahrb., 41 (1911), No. 3–4, pp. 373–387*).—This article refers to previous experiments by M. Maercker from which the conclusion was drawn that the highest yields of beets can not be obtained with commercial fertilizers alone, and reports experiments made near Berlin on 0.02 acre plats to determine the effect of mineral fertilizers—nitrate of soda, kainit, and Thomas slag—in three different amounts, alone and combined with stable manure, for fodder beets grown in 1906 followed without further application of fertilizer or manure by oats in 1907 and wheat in 1908.

The highest yields of beets were obtained with mineral fertilizers combined with manure, especially with the smaller amount of fertilizers. When the largest (triple) amounts of the mineral fertilizers were used, namely, 660 lbs. of nitrate of soda, 1,980 lbs. of kainit, and 1,320 lbs. of Thomas slag per acre the yields were but slightly less than when the same amounts of mineral fertilizers were combined with stable manure, 22 tons per acre. Stable manure alone produced about the same yield as the smallest application of mineral fertilizers (1/3 of the amounts given above). There was a decided after effect of the fertilizers, and especially of the manure, upon the oat crop in 1907 but no effect upon the wheat crop of 1908. The mineral fertilizers were more active alone than in combination with the manure, since the increased yield with added manure was not proportional to the amount of fertilizing matter which the manure supplied.

Apparently the manure unfavorably affected the utilization of the mineral fertilizers the first year. The results, however, did not bear out B. Schulze's conclusion (E. S. R., 22, p. 716; 26, p. 424) that after the first year there is an increasing action of the mineral fertilizers accompanying a decreased effect of the manure.

Conducting an experiment farm during twelve years with green manures and artificial fertilizers, VON BLEZE (*Trudy Opytn. Stantsii Kurländsk Obshch. Selsk. Khoz., 1 (1904–1909), pp. 3–32; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 1, pp. 94–96*).—The severe climatic conditions of the Baltic provinces do not permit the maturing of lupines which are so largely used in Germany as the foundation of farming without manure, and this has resulted in the almost complete absence of crop raising without manure in this region. In 1893 the Curland Agricultural Society, on the initiative of the author, undertook experiments to determine whether farming without manure could be profitably carried on with the aid of vetches and clover as green manures, rotating with rye, oats, potatoes, and barley. In the course of this rotation each field received during the first and fourth years Thomas slag and kainit, the second year bone meal, and the third and sixth years lime and nitrate.

The general conclusion reached was that profitable farming could be carried on under the climatic conditions with green manures and artificial fertilizers alone even on very poor soils.

Fertilizers, 1911, E. H. JENKINS and J. P. STREET (*Connecticut State Sta. Rpt. 1911, pt. 1, pp. 100*).—This report deals briefly with the requirements and observance of the state fertilizer law, the distribution and classification of the fertilizers collected, and analyses and valuations of 780 samples of fertilizers and

fertilizing materials examined during the year. For the first time "the analyses of mixed fertilizers include determinations of the solubility of the organic nitrogen both in water and in an alkaline solution of potassium permanganate." The results are stated as (1) water-soluble organic nitrogen, (2) active insoluble organic nitrogen, and (3) inactive insoluble organic nitrogen. The reasons for this are stated as follows: "Organic nitrogen costs four or five times as much as phosphoric acid or potash, and the forms in which it is used in mixed fertilizers differ greatly in market price as well as in agricultural value. Some method for distinguishing the forms which have real agricultural value from those which are comparatively inert is most desirable, and after several years of study and experiment both here and elsewhere methods have been devised to determine the solubility of organic nitrogen and thus to distinguish between the two forms of nitrogen with enough accuracy to make their use helpful in judging of the quality of organic nitrogen."

Experimental work on the availability of organic nitrogenous fertilizers at the Connecticut Station is presented in 3 papers by J. P. Street as follows:

A modification of the neutral permanganate method to determine the solubility of organic nitrogen (pp. 9–11).—It was found that the method originally proposed by the author (E. S. R., 23, p. 706) gave misleading results when used with certain mixtures of acid phosphate and organic nitrogen, but this difficulty was overcome and satisfactory results were obtained by adding 1 gm. of sodium carbonate just before the permanganate solution was introduced.

Solubility of organic nitrogen of raw materials by the alkaline permanganate method (pp. 12–14).—Results of tests of 55 samples of fertilizer materials by this method are reported and compared with results of tests by the neutral permanganate method with dried blood, tankage, dried fish, and castor pomace. The neutral permanganate method gave decidedly higher results than the alkaline permanganate method. "There is no question that either method serves as a useful means of distinguishing between such materials as blood, bone, tankage, and fish on the one hand, and materials like peat and leather on the other. . . . In a valuable material, such as castor pomace, the alkaline method shows an average solubility of 48.2, classing it, if judged by this figure alone, with the inferior materials. The neutral method gives castor pomace a solubility of 88, close to that obtained with other high-grade materials. In such instances as this, if the alkaline method is to be used with any certainty, strict attention must also be given to the amount of water-soluble organic nitrogen," which averages 78 per cent in castor pomace but is present only in traces in peat.

Pot experiments on nitrogen availability (pp. 14–23).—The main object of these experiments was to compare hair tankage, garbage tankage, and treated leather used in the "wet mixing" process of fertilizer manufacture, which is described, with such materials as sodium nitrate, cotton-seed meal, and peat. The tests were made in ordinary 8-in. flower pots containing 13 lbs. of mixed soil (7 parts sand and 1 part garden soil) to which was added a basal fertilizer of 1.5 gm. of potassium sulphate, 4 gm. of acid phosphate, and 2 gm. of calcium carbonate. The nitrogenous fertilizers were as a rule applied at rates supplying 0.15 gm. of nitrogen per pot. Millet and oats were the crops grown. The results measured in crop yield and nitrogen recovery "indicate that the 'wet-mix' acid treatment of materials, like hair waste, treated leather, and garbage tankage, yields a fertilizer of high crop-producing power with millet and oats, and one whose nitrogen availability to these crops is superior to that of cotton-seed meal, and from 60 to 75 per cent of that of nitrate of soda. Furthermore, in these tests the value of the base-goods nitrogen rested almost entirely on the

portion which is soluble in water, this portion showing an availability of from 63 to 74 per cent of that of nitrate of soda with millet and oats."

Commercial fertilizers, J. S. Burd (*California Sta. Bul. 221, pp. 35–97*).—The results of analyses and valuations of fertilizers inspected by the California Fertilizer Control during the fiscal year ended June 30, 1911, are reported in this bulletin with a brief discusssion of the methods, purpose, and practical importance of valuation of fertilizers. Certain modifications of eastern schedules of trade values to make them applicable to California conditions are pointed out.

The sworn returns of fertilizer dealers indicate that the sales of fertilizer in the State during the year ended June 30, 1911, was 46,000 tons as compared with 36,634 tons the preceding year.

[Imports of fertilizer raw materials] (*Amer. Fert., 35 (1911), No. 14, pp. 34, 35*).—A table is given showing imports into the United States during 1909, 1910, and 1911 of various fertilizer materials and by-products of fertilizer factories.

The Indian saltpeter industry, J. W. Leather and J. N. Mukerji (*Agr. Research Inst. Pusa Bul. 24, pp. 19, pls. 5; abs. in Oil and Colour Trades Jour., 40 (1911), Nos. 688, pp. 2097, 2098, fig. 1; 689, pp. 2174, 2175, fig. 1; 41 (1912), No. 690, pp. 37, 38, fig. 1; Nature [London], 88 (1912), No. 2201, pp. 330, 331; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 1, pp. 86–89*).—It is shown that this industry is a very ancient one in India, but apparently the production is slowly declining. The export amounts at the present time to about 200,000 tons of potassium nitrate per annum.

The native methods of extraction of the nitrate from soil collected in villages and of refining the crude product are fully described in this article, and possible improvements, especially of the methods of refining, are suggested. The methods now in use are substantially as follows: The village earth, which usually contains from about 3 to 5 per cent (sometimes as low as 1 or as high as 29 per cent) of potassium nitrate associated with chlorids and sulphates, is mixed with wood ashes and carefully packed in layers from 6 to 8 in. deep in an earthen chamber called Kuria made of wet mud which is afterwards allowed to dry and harden. "The floor of this slopes somewhat from back to front, where a hole is made at the lowest point for the escape of the nitrate liquor. Raised a few inches above the floor, and supported by a few loose bricks, is a false bottom made of bamboos and matting, on which the saltpeter earth is laid with the greatest care and so trodden in that no crevices shall exist. . . . A small piece of matting is then laid on the top, and water is poured in until about 1 in. lies on the surface of the soil." After several hours the percolate "usually emerges as a fairly concentrated clear solution, colored brown by organic matter. The first runnings are put into a pan and further concentrated by exposure to the sun, or by boiling over a fire until a mixture of sodium chlorid and potassium nitrate, with varying quantities of sodium sulphate and magnesium nitrates, separates out. This is sold to the refiner as crude saltpeter. The mother liquor is thrown on to the heap of saltpeter earth, the so-called factory, to which are also added the wet soil from the 'Kuria' and the weaker solution of nitrates coming out in the later stages of the percolation and requiring too much fuel to make further concentration worth while. After a time the heap can again be extracted, and so the process goes on perpetually. Fresh village earth is constantly being added, but no special additions of organic matter seem to be made.

"At the refinery the crude saltpeter, the impurities of which are soil, sodium sulphate, sodium chlorid, and magnesium nitrate, is added to a boiling mother liquor from a previous operation. This liquor, being already saturated with

sodium chlorid and sodium sulphate, only dissolves the nitrate. When the insoluble matter has subsided, the clear liquor is run into wooden vats, and on cooling deposits a good deal of potassium nitrate, that only requires to be drained and slightly washed to be ready for market. The insoluble material still contains some potassium nitrate, and is thrown out on to the factory heap of niter earth, from which more nitrate is subsequently again extracted as before. The mother liquor can not be used indefinitely for the purification of the crude saltpeter, but it is not wasted. When it becomes too impure for further use, it is concentrated to deposit some of the sodium chlorid, and the final liquor is simply thrown on to the factory heap again. While the extraction process is remarkably efficient, considering that it has been evolved by the natives themselves without outside help, the refinery process is admittedly wasteful."

A product containing as high as 96 per cent of potassium nitrate is obtained by the processes described, the principal impurities being sodium and potassium chlorids and sulphates. The principal by-product is common salt.

Ammonia evaporation and transformation in soils, J. von Wlodeck (*Diss. Berlin, 1911, pp. 88; abs. in Zentbl. Agr. Chem., 40 (1911), No. 11, pp. 729–734; Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 6–12, p. 270; Jour. Chem. Soc. [London], 102 (1912), No. 591, II, pp. 85, 86*).—The lower fertilizing efficiency of ammonium sulphate as compared with sodium nitrate has been ascribed to various causes including slowness of nitrification, fixation of nitrogen in organic forms, and evaporation of ammonia. The author reviews work of other investigators on the subject, and reports experiments on soils in sunken cylinders to determine the loss and transformation of ammonia from soils containing varying amounts of lime, silt, and clay, and with varying applications of ammonium sulphate, either alone or in combination with superphosphate.

The loss of ammonia by evaporation, when the ammonium sulphate was used under conditions as nearly natural as possible, was very small. With a high lime content of the soil and heavy applications of ammonium sulphate the loss was larger. There was little or no loss when a mixture of ammonium sulphate and superphosphate was used. Deep applications of the ammonium sulphate greatly reduced loss of ammonia.

The results of observations on fixation of the ammonia in organic forms were not entirely conclusive, but indicated that fixation in case of a loam soil was practically the same whether the ammonium sulphate was used alone or mixed with superphosphate. On a light soil, however, the superphosphate appeared to increase nitrogen fixation. The addition of superphosphate apparently did not affect nitrification.

Lime nitrogen and lime niter as nitrogenous fertilizers, B. Heinze (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. 79–94, XX–XXII*).—This article briefly describes the preparation and properties of calcium cyanamid and calcium nitrate, and discusses their value and behavior as nitrogenous fertilizers (E. S. R., 22, p. 621). Pot experiments with these materials in comparison with other nitrogenous substances are referred to, the most important new conclusions reached being that while ammonia is quickly formed from calcium cyanamid in the soil it is slowly converted into nitrates, and that the ammonia is formed, in part at least, by purely chemical processes.

The hygroscopicity of certain new nitrogenous fertilizers, H. von Feilitzen and I. Lugner (*Chem. Ztg., 35 (1911), No. 108, pp. 985, 986, figs. 2*).—These investigations have already been noted from another source (E. S. R., 25, p. 727).

[Experiments with potash fertilizers in Pas-de-Calais], L. Malpeaux (*Jour. Agr. Prat., n. ser., 22 (1911), No. 50, pp. 754–757*).—In experiments car-

ried out mainly at the agricultural school of Berthonval it was found that sulphate of potash was particularly beneficial to clovers, and improved the character of herbage in natural grass lands. Equally beneficial results were obtained in experiments with potassium chlorid applied to oats. With sugar beets and potatoes the best results were obtained with sulphate of potash and kainit, and the chlorid was apparently not well suited to these crops.

Summarizing the results of a large number of tests, the author concludes that potassium chlorid is more particularly suited to oats; the sulphate to tobacco, beets, and potatoes; and kainit to flax and grass lands. In case of beets and potatoes the potash salt should be applied in autumn or winter.

Potash lime, von Seelhorst (*Rev. in Deut. Landw. Presse, 39 (1912), No. 1, pp. 3, 4*).—The fertilizing value of this material, obtained by treating the waste waters of potash factories with caustic lime, was tested in pot experiments with barley and beans grown on sandy and loam soils.

The results were inconclusive but seem to warrant further investigation in view of the fact that the material contains considerable amounts of valuable fertilizing constituents and utilizes a by-product which would injuriously contaminate streams if allowed to flow into them. The material used in these experiments contained total nitrogen 0.07 per cent, water-soluble potash 1.92 per cent, lime in the form of caustic lime and carbonate 40.9 per cent, and phosphoric acid 0.15 per cent.

Phonolith as a fertilizer, R. P. Skinner (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 26, pp. 490, 491*).—This article notes briefly the attempt to put this material, which is a silicate of potash found in volcanic rocks occurring in the Eifel Mountains, in competition with the Stassfurt potash salts. The material is stated to contain from 8 to 10 per cent of potash, and can be mined and ground for $4.76 per carload. It is shown that, while the results of tests of this fertilizer on different kinds of crops have been somewhat conflicting, they generally indicate a very low fertilizing value for the material as compared with potash salts.

Alunite, a newly discovered deposit near Marysvale, Utah, B. S. Butler and H. S. Gale (*U. S. Geol. Survey Bul. 511, pp. 64, pls. 3*).—The location, character, extent, and commercial importance of this deposit are described, as well as the geology of the region in which it occurs. Notes are also given on the occurrence of alunite in other parts of the United States and in foreign countries.

The discovery is of particular significance because of the fact that this mineral can be made to yield potassium sulphate by a comparatively simple process of heating or calcination and may thus become a comparatively cheap source of potash. "The Marysville deposit, so far as now known, is not of such magnitude as to afford a source of all the potash salts now consumed in the United States, but it may prove to be an important factor in providing an American supply that will perhaps be especially available to local and western markets, particularly in meeting the demand for higher grade salts." A simple field test for alunite is given.

The potash search in America, G. E. Mitchell (*Amer. Rev. of Reviews, 45 (1912), No. 1, pp. 73–77, figs. 3*).—A brief account is here given of the efforts which are being made by the U. S. Geological Survey and the Bureau of Soils of this Department to develop a domestic supply of potash, including deep borings for salt deposits, the study of methods of extracting potash from potash-bearing minerals, and the utilization of giant kelps of the Pacific coast.

The German Potash Syndicate, T. J. Albert (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 265, pp. 760–762*).—The present organization of this

syndicate as compared with that of an American trust is described, and references are given to previous consular reports on the German potash industry.

The effect of phosphorus manuring on the amount of inorganic phosphorus in flat turnip roots, B. L. Hartwell and F. S. Hammett (*Jour. Indus. and Engin. Chem., 3 (1911), No. 11, pp. 831, 832*).—In view of the suggestion that the flat turnip may furnish a reliable means of judging of the available phosphorus in soils, the authors undertook to devise accurate methods for the determination of the inorganic phosphorus of turnips. The method finally adopted was as follows:

"Grate portions of fresh turnips in the presence of sufficient acetic acid to equal about 2 per cent of the moisture, finally squeeze the juice from the pulp, filter, add to an aliquot barium chlorid solution with constant stirring, then carefully neutralize with ammonium hydroxid, allow to stand about a day, filter, wash, dissolve as much as possible of the contents of the filter in hot water and dilute nitric acid, wash, and determine the phosphorus in the filtrate by molybdenum and magnesium mixtures in the usual way. In calculating the percentage of inorganic phosphorus in the turnips it was assumed that the percentage of phosphorus in the expressed juice was the same as that in the moisture remaining with the pulp. A determination of moisture in the turnips, therefore, made it possible for the results to be calculated on the basis of dry turnips."

The results of a number of analyses by this method showed "that although the content of total phosphorus in turnips was nearly doubled by the addition of a liberal amount of acid phosphate, the content of inorganic phosphorus was increased about six-fold."

The influence of calcium carbonate on the action of different phosphates, D. Prianishnikov (*Landw. Vers. Stat., 75 (1911), No. 5–6, pp. 357–376; abs. in Chem. Zentbl., 1911, II, No. 22, p. 1706*).—The effect of calcium carbonate in amounts varying from 0.1 to 1 per cent on dicalcium and tricalcium phosphates, bone meal, phosphorite alone and combined with ammonium sulphate and sodium nitrate, Thomas slag, iron and aluminum phosphates, and monopotassium phosphate in sand cultures with wheat, oats, barley, peas, and buckwheat are reported.

As a result of these experiments the author divides the phosphates of calcium into two groups, one containing monocalcium and dicalcium phosphate and Thomas slag, which are little affected by addition of calcium carbonate, the other group including tricalcium phosphate, bone phosphate, and phosphorite, the assimilation of which is depressed to a marked extent by the addition of calcium carbonate. When, however, ammonium sulphate was substituted for nitrate nitrogen as a source of nitrogen, the addition of lime was beneficial in every case, at least under the conditions of these experiments. Calcium carbonate had no appreciable depressing effect upon the assimilability of iron and aluminum phosphate. These phosphates showed a fairly good degree of assimilability and were gradually decomposed by water. It therefore appears that root secretions do not play the important rôle in the assimilation of these phosphates that has heretofore been ascribed to them.

The action of gypsum on nitrification, S. Dezani (*Staz. Sper. Agr. Ital., 44 (1911), No. 2, pp. 119–137; abs. in Chem. Zentbl., 1911, II, No. 3, p. 157; Jour. Chem. Soc. [London], 100 (1911), No. 589, II, p. 1019*).—Experiments with natural and artificial soils and culture solutions showed no material increase of nitrification when gypsum was added in amounts varying from 0.5 to 2 per cent.

Peat moss litter manure (*Jour. Bd. Agr. [London], 18 (1911), No. 9, pp. 756–758*).—It is stated that the use as a stable litter of peat moss obtained from

Denmark is increasing in England, but that the manure produced, although cheaper than straw made manure, is considered less valuable by market gardeners. In experiments at the Kew Botanical Gardens it was found that fresh peat litter manure was decidedly injurious to flowering plants. An analysis of a sample of this manure by J. A. Voelcker indicated nothing unusual in its composition except a somewhat high percentage of organic acids, and its injurious effect is attributed to this acid condition.

Experiments on the agricultural utilization of vinasse from sugar beet distilleries, PELISSIER and LE COUPPEY DE LA FOREST (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1908, No. 38, pp. 274–304, pls. 4, figs. 4*).—This article reports the results of practical experience in the use of this vinasse in irrigation for sugar beets and also of experiments to determine the most efficient means of utilizing the material. It is strongly recommended that the material should be used for irrigation wherever this is feasible, although purification by means of artificial filter beds is an efficient means of disposal where utilization for irrigation is not possible.

Studies on the waste waters of starch factories, A. C. GIRARD (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1908, No. 38, pp. 245–273, fig. 1*).—It is shown that there is much loss of fertilizing matter in the waste waters from starch factories in France, although the waters are very dilute, containing as a rule something over 99 per cent of water. The dried residue, however, contains 6.56 per cent of nitrogen, 2.78 per cent of phosphoric acid, and 13.64 per cent of potash, with 2.11 per cent of lime. The agricultural use of the wastes is considered highly desirable, but with such dilute solutions as are now produced is not practicable except for small factories.

A method of extracting the juice of the potatoes by means of presses before washing for the preparation of starch is recommended, and it is believed that this will furnish a concentrated extract which can be profitably handled as a fertilizer. Analysis of a juice obtained in this way showed dry matter 5.03 per cent, nitrogen 0.35 per cent, phosphoric acid 0.12 per cent, potash 0.65 per cent, and lime 0.01 per cent. It is estimated that by this method 1,000 lbs. of potatoes may be made to yield as a by-product fertilizing material worth 58 cents.

Cassia hirsuta as a green dressing, R. D. ANSTEAD (*Planters' Chron., 6 (1911), No. 52, pp. 801, 802*).—The use of this plant with good results as a green manure for coffee is reported. An analysis is given showing in the air-dried plant (leaves and stems) 9.6 per cent of water, about 2.3 per cent of nitrogen, 0.31 per cent of phosphoric acid, 1.07 per cent of potash, and 1.82 per cent of lime.

AGRICULTURAL BOTANY.

Plant life and evolution, D. H. CAMPBELL (*New York, 1911, pp. IV+360, figs. 22*).—The author considers life and its origin, heredity, environment, selection, etc., as factors in evolution. The origin of the lower plants, land plants, and seed plants is traced, after which chapters are devoted to environment and adaptation, plant distribution, the human factor in evolution, and the origin of species.

It is claimed that no one of the theories that have been advanced can fully explain evolution in the plant kingdom. The author thinks there is nothing to support the view of a special germ plasm directly associated with the transmission of hereditary characters. The view that the laws of heredity are exclusively physiological is believed to be an extreme one, nor does it seem necessary to assume the presence of an infinity of morphological units. The

author thinks it possible that the protoplast contains invisible organs, but that the development of the organism depends quite as much on their response to stimuli as to their actual form or chemical nature. Whatever the origin of new forms, their survival, he claims, depends upon natural selection.

The variegation of leaves and its transmission through grafts, E. GRIFFON (*Bul. Soc. Bot. France, 58 (1911), No. 4–5, pp. 289–297*).—A discussion is given of the possibility of transmitting variegation to stock from scions, and the author gives the results of investigations which have been carried on for several years at Grignon, in which a considerable number of variegated ornamentals have been grafted on green stock of the same species.

He claims that his investigations confirm those of others which show that plants with colored leaves react toward the stock in different ways. When the color of the leaves is red or violet, indicating the presence of anthocyanin in the cell sap, the variegation is not transmitted by the graft to the leaves of the stock, nor is the white variegation commonly transmitted. However, when the variegation is yellow, especially when the leaves present a marbled appearance, it is nearly always transmitted by the graft. In this case the results agree with the conclusions of Lindemuth and Baur (E. S. R., 20, pp. 131, 1047) regarding what is called infectious chlorosis.

A botanical study of some varieties of Solanum tuberosum and of related wild species of Solanum, P. BERTHAULT (*Ann. Sci. Agron., 3. ser., 6 (1911), II, Nos. 1, pp. 1–59, figs. 20; 2, pp. 87–143, figs. 16; 3, pp. 173–216, figs. 12, dgm. 1; 4, pp. 248–291, pls. 9, figs. 3*).—Anatomical and morphological studies were made of about 350 varieties of cultivated potatoes and of 35 species of Solanum that are more or less closely related to *S. tuberosum*, the object being to learn if possible the origin of the cultivated potato.

The author claims that the cultivated potato differs from all the spontaneous species of Solanum and that its ancestry was probably a *S. tuberosum* which was a spontaneous variation now very rare or long since disappeared. The only species that closely resemble the cultivated potato are believed to be aberrant forms or possibly hybrids of *S. tuberosum*.

On the parentage of a wheat, B. KAJANUS (*Bot. Notiser, 1911, No. 6, pp. 293, 294*).—The splitting into several types of a stock of wheat (*Triticum turgidum*) under observation called attention to a supposed spontaneous crossing occurring probably 4 years ago. The parentage on the male side is in doubt, being attributable to *T. vulgare* or to *T. spelta*. Although von Tschermak found on crossing *T. vulgare* with *T. spelta* that the posterity resembled *T. spelta* rather than *T. vulgare* in the ratio of 3:1, the author believes that these descendants show the inverse ratio of more or less resemblance to *T. spelta* as opposed to nonresemblance. He considers *T. spelta* as probably the male parent.

Concerning a new species of shepherd's purse, P. BECQUEREL and S. BUCHET (*Bul. Soc. Bot. France, 58 (1911), No. 4–5, pp. 376–380*).—A discussion is given of the origin of a species of Capsella, called by Blaringhem *C. viguieri*, which very often bears 4 carpels. This species has been held to be a mutant from the common *C. bursa-pastoris*, but the authors in their discussion seem to be inclined to doubt its reputed origin or recent appearance.

Anatomical researches on cactus from the viewpoint of its being adapted to a dry climate, J. BÉDÉLIAN (*Nuovo Gior. Bot. Ital., n. ser., 18 (1911), No. 4, pp. 399–458, pls. 3*).—Sixty-three species included in 14 genera of cacti from the botanic garden at Palermo were examined as to peculiarities of structure, and also with regard to the character of the cell contents as related to the absorption, retention, transmission, and transpiration of water. The species are described in detail and numerous measurements are given.

Evidences of adaptation to conditions of exposure to very dry air and to the hot sun are noted. The adaptive devices mostly fall into 2 general categories, one of elements contributing to the accumulation of water, as storing spaces and tissues generally, and the second of elements retarding loss, as reduced evaporative surfaces, thickness of cuticle, scarcity of stomata, gelatinous cell contents, etc.

A brief bibliography is appended.

The water relations of desert plants, D. T. MacDougal (*Pop. Sci. Mo., 79 (1911), No. 6, pp. 540–553, figs. 5*).—This is a popular presentation, in part of matter previously noted (E. S. R., 25, p. 219). After some general discussion of desert types and of their behavior under natural or controlled desiccation, the results of further investigations are given.

It was found that the transpiration of a leaf increases from early morning until some time in the forenoon, when it suddenly drops. An explanation offered is that the film of moisture on the internal leaf cells thins out and breaks, and that thereafter evaporation can take place only from the edges of the water layers in the interstices. This breaking point shows no regular relation to the wilting point of a plant.

A discovery was also made that there is a large daily variation in the acidity of the succulents, the amount of acid present at the maximum in the morning being frequently about 4 times that found at the minimum in the evening. The change seems to be related to the course of the temperature, and it may be significant in connection with the water-holding capacity of the cell colloids.

Concerning the value of the great water balances of the succulent plants, a review of the extensive data accumulated establishes the fact that Echinocactus may live for nearly 3 years at the expense of its water balance, which may be depleted as much as 50 per cent before death results. Carnegiea loses nearly 30 per cent before serious results follow, and its seedlings may live when reduced to only one-third of the original weight.

The rôle of individual nutritive elements in the activity of the plant, A. G. Doîarenko (*Dnevn. XII. S''ĕzda Russ. Est.-Isp. i Vrach [Moscow], p. 673; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, pp. 600, 601*).—Experiments were conducted to determine the influence of a deficiency or excess of nitrogen, phosphoric acid, and potash on the total yield, the relative yield of the different plant organs, and the accumulation of various organic substances in plants.

The data obtained seem to indicate that the nitrogenous materials influence the predominance of leaf organs, and potash the predominance of the stem organs. Potash, in the case of flax, increased the amount of fiber.

A detailed study of the formation of various nitrogenous compounds seems to show that under the influence of potash nutrition nonalbuminoid nitrogen is accumulated as well as organic bases and amids.

The rôle of silica in the nutrition of plants, A. Sprecher (*Bul. Soc. Bot. Genève, 2. ser., 3 (1911), No. 4, pp. 155–192, figs. 4*).—Experiments with *Avena sterilis* grown in 4 culture solutions with and without silica are reported.

The Knop-Pfeffer solution gave the best results. This is believed to be due to the slight acidity from the iron chlorid and potassium acid phosphate. The addition of silica to the solutions in general increased the dry weight as well as the important constituents, such as ash, proteid substance, crude fiber, and carbohydrates, although there was some variation in the proportion, due probably to the different culture solutions.

Where the same compounds were available silica was less abundant in the well grown plants than in those poorly developed. The percentage of mineral salts absorbed by the plants diminished with the addition of silica, although

the absolute ash became greater. In the lots without silica the plants contained greater amounts of lime, phosphoric acid, and iron in proportion to potash.

Without affirming that it is necessary to plants, the author believes that silica has an important biological function in stimulating plants to greater growth, and that it probably plays the rôle of maintaining a physiological equilibrium in the nutritive solutions in the soil.

A bibliography is appended.

The oxygen minimum and the germination of Xanthium seeds, C. A. SHULL (*Bot. Gaz., 52 (1911), No. 6, pp. 453–477, fig. 1*).—Attention is called to the fact that while there have been many studies on delayed germination, little has been done toward solving the problems presented by this phenomenon.

During the past 2 years the author carried on investigations on the relation of oxygen pressure to the germination of Xanthium seeds. He found that the naked embryos of the dimorphic seeds of Xanthium exhibit a marked difference in their demand for oxygen for germination, the minimum for the germination of the decorticated upper seeds at a temperature of 21° C. being approximately 12 mm., while for the lower it was about 9.5 mm. Increasing the temperature 10° lowers the minima to 7 and 3 mm., respectively. The variation of the total atmospheric pressure was found not to influence the oxygen minimum for germination. The author found that there was very little after-ripening, or at least that the after-ripening was not visible in an altered germination behavior at atmospheric pressure and ordinary temperatures. There is evidence, however, of a decrease in the oxygen requirement or an increase in permeability of the coats to oxygen as ripening progresses. There is said to be a slow progressive deterioration of the seeds, which after a few years entirely lose their power to germinate.

The general conclusion that the organs of the seeds of higher plants can grow in entire absence of free oxygen is not supported by the results obtained. On the other hand, it appears that they can not grow without comparatively large amounts of oxygen. The oxygen pressure required for the germination of the cocklebur seeds was found to be much higher than that reported by Lehmann for sunflowers, zinnias, *Glyceria fluitans*, etc.

The high oxygen demand, and the difference in this demand in the two seeds, act with the coats to secure delay and a difference in delay, in the germination of the two seeds.

The origin of osmotic effects.—IV, Note on the differential septa in plants with reference to the translocation of nutritive materials, H. E. and E. F. ARMSTRONG (*Proc. Roy. Soc. [London], Ser. B, 84 (1911), No. B 571, pp. 226–229*).—In a previous paper (E. S. R., 25, p. 26) the authors call attention to the osmotic phenomena in plants which are correlated with effects produced by substances to which they have extended the term hormone. Subsequent studies have shown that the osmotic effects conditioned by hormones indicate that the translocation of nutritive materials takes place periodically.

The authors' observations show that the outer differential septa in plants are permeable only by substances of a particular type, apparently those having but slight affinity for water. If this is true, other substances such as sugars, for example, can not pass through the septa unless in some measure they are broken down. Studies of *Saxifraga sarmentosa* indicate that the cells generally are lined with a septum which is differentially permeable, and it is supposed that the difference in osmotic tension is conditioned by the differential permeability of this thin protoplasmic membrane.

Experiments are cited in which the authors studied the special effect produced by hydrocyanic acid in relation to hydrolysis. If the hormone used is

hydrocyanic acid, although changes may take place within the leaf no reducing sugar passes into the solution when the leaves are placed in water. This difference has been noticed in the case of a variety of leaves and roots as well as in unripe fruits of the cherry and currant, unripe seed pods, etc.

The differences in the blackening of leaves on exposure to water saturated with chloroform or toluene seem to be proof that differential septa which break down under the influence of most hormones remain intact when hydrocyanic acid is used, although hydrolytic changes take place within the leaf under the influence of the hydrocyanic acid. The authors state that, taking into account the manner in which leaves change in appearance when exposed to water saturated with a substance such as toluene, there can be little doubt that the coloration is at least mainly an oxidation effect, and bearing in mind what is known of the effect which hydrocyanic acid has in inhibiting oxidation, it appears probable that differential septa remain intact because the oxidase effect is eliminated in the presence of hydrocyanic acid. It is also stated that oxidation processes are at a maximum in plants during the period when light is inactive, and that growth takes place chiefly during this period. The translocation of nutritive materials which necessarily sets in during this period may well take place because the septa are broken down and rendered permeable by oxidation. The differential septa are believed to be subsequently repaired when assimilatory processes become ascendent.

Light intensity and transpiration, B. E. LIVINGSTON (*Bot. Gaz., 52 (1911), No. 6, pp. 417–438, fig. 1*).—The author has tested a number of forms of apparatus to determine their value in estimating quantitatively various light intensities to which plants in the open are subject.

He found that the black and brown atmometers and the Hicks integrator are valuable instruments for estimating the solar intensity, so far as transpiration is concerned. He thinks they should be suitable for comparing light intensities in different habitats and that they are especially to be recommended on account of their power of automatic integration, and also on account of the fact that they give their results in terms of vaporization of a liquid, thus resembling the plant in its transpiration activity. The black bulb thermometer was found one of the best of the nonintegrating devices. Photographic papers are not to be recommended, mainly on account of their failure to record effects of other than restricted wave lengths. It is possible that photographic papers are more valuable than the other instruments tested when the effects of light variation on photosynthesis rather than transpiration are to be determined.

The microscopic analysis of smoke-injured plants, P. SORAUER (*Samml. Abhandl. Abgase u. Rauchschäden, 1911, No. 7, pp. 58, pl. 1*).—The author undertook a series of investigations on the anatomical characters of plants injured directly or indirectly by smoke or vapors of various sorts. Confining attention to the pine he gives an account of the supposed characteristics found in plants subject to smoke or fumes of sulphuric and hydrochloric acids, asphalt, etc. It is stated that the amount of damage due to effluvia of industrial establishments, etc., depends not alone upon the quantity of poison received, but that the mode of its working, as by constant but weak or short attacks of highly concentrated poisons, is also a factor in the degree of injury.

The work is claimed to be only a preliminary attempt at differentiating clearly and safely the typical smoke effects from those due to other causes.

FIELD CROPS.

Seedtime and harvest: Cereals, flax, cotton, and tobacco, J. R. COVERT (*U. S. Dept. Agr., Bur. Statis. Bul. 85, pp. 152, figs. 27*).—This is the first of a series of treatises on the dates of planting and harvesting. "The series includes

about 50 crops grown in this country and many crops in foreign lands, and the data are designed for the use of this Department and the agricultural experiment stations, and to meet the demands of correspondents. The basis of the undertaking is the information obtained as the result of a world-wide inquiry addressed to thousands of practical and intelligent farmers, to agricultural teachers, and to the experiment stations. The collection and preparation of this information combine to make this a large undertaking and provide materials for future work by phenologists and expert agriculturists."

The treatise is divided into 2 parts. Part 1 deals with corn, wheat, oats, barley, rye, buckwheat, flax, cotton, and tobacco. The dates and length of the planting and harvesting season of each are presented by tables and are discussed. Part 2 deals with the northward and southward movements of the planting and harvesting of the various crops and presents planting curves. The length of the growing season and the relation of the statistical data presented to farm practice are discussed.

Preparation of new land for crops, A. KEYSER (*Colorado Sta. Circ. 10, pp. 11*).—Brief suggestions are given as to the preparation of sagebrush, small timber, and other lands for crops.

[Moisture content of fallowed land at Poltava], S. TRETYAKOV (*Khutorianin, 1910, No. 16; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 5, pp. 743, 744*).—At the Poltava experiment field corn-fallowed land showed a moisture content July 7 of 14.24 per cent in the surface 25 cm. of soil and 16.6 per cent in the surface 100 cm. as compared with 9.57 and 16.22 per cent, respectively, on black fallow. After a winter of light snowfall it was found that the cornstalks left on the land had been conducive to the accumulation and retention of soil moisture. Such land showed a moisture content of 6.35 per cent in the surface 100 cm. as compared with 5.83 per cent in case of black fallowed land. Data presented show that there was a deficiency of winter wheat on corn fallow, but that it was more than offset by the better yield of the summer crop and by the corn crop.

Experiments in the improvement of old pasture, 1908–1910, W. BRUCE (*Edin. and East of Scot. Col. Agr. Rpt. 23, 1911, pp. 8*).—This reports the results of the application of fertilizers to old pastures as indicated by the number of pounds of mutton produced. A 4-acre fertilized plat produced in 3 years 655 lbs. live weight more mutton valued at £3 13s. ½d. than was produced on an unfertilized plat.

Report on experiments on the improvement of poor permanent pasture, J. HENDRICK (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 1–40*).—The results obtained have been noted from another source (E. S. R., 25, p. 372).

Report on experiments on the improvement of poor permanent pasture by manuring, R. P. WRIGHT (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 171–183*).—The pasture on which this experiment was conducted was covered with moss and its soil was a uniform pure peat to a depth of about 10 ft. and thoroughly drained. The grasses consisted mostly of common bent grass (*Agrostis vulgaris*) and Yorkshire fog (*Holcus lanatus*). The results of applications of basic slag and kainit are reported and compared in terms of the effects produced upon sheep grazed on the fertilized and unfertilized plats during the period 1904–1910.

Basic slag alone, 10 cwt. per acre, produced a considerable and profitable effect, but the addition of 8 cwt. of kainit greatly increased the profits and produced a more permanent improvement in the pasture. Tables state the weights of the sheep pastured on these plats during each of the grazing seasons of the experiment.

Report on an experiment on the improvement of poor permanent pasture by manuring, R. P. WRIGHT (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 187–192*).—This experiment was similar to the above except that the soil of this Perthshire field was a light stony loam and its grasses were hard fescue (*Festuca duriuscula*), common bent grass (*Agrostis vulgaris*), bedstraw (*Galium witheringii*), and tufted hair grass (*Aira cæspitosa*).

The application of basic slag at the rate of ½ ton per acre appeared profitable. The moss could be effectively destroyed by applications of basic slag, especially if kainit were added also, but the author believes that the additional advantage derived from kainit may prove insufficient to defray its cost. Tables state in detail the effect of the fertilizers upon the live weight of the sheep pastured on the fertilized and unfertilized plats.

[Fertilizer and variety tests with field crops], T. S. PARSONS (*Wyoming Sta. Rpt. 1911, pp. 41–45*).—In a test of 8 alfalfa varieties, German Seed and Grimm produced the highest yields, 3,300 and 2,900 lbs. per acre, respectively. In a test of 12 applications of ammonium sulphate, dried blood, nitrate of soda, phosphate, potash, and stable manure, singly or in various mixtures, or the use of rye and peas as green manuring crops, the highest yield of oats followed an application of nitrate of soda at the rate of 120 lbs. per acre.

[Experiments with field crops, Barbados, 1910–11], J. R. BOVELL (*Rpt. Local Dept. Agr. Barbados, 1910–11, pp. 48*).—This is a continuation of work already noted (E. S. R., 25, p. 32).

[Experiments with field crops], F. WATTS ET AL. (*Rpts. Bot. Sta. [etc.] St. Kitts-Nevis, 1910–11, pp. 9–13, 15–33*).—Liming numerous peanut plats was followed by variable results, in some cases being apparently decreased while in others it remained exactly the same or was increased up to about 18 per cent. The results of variety tests of yams, cassava, peanuts, and sweet potatoes are reported.

Fertilizer tests with cotton occupying 38 plats were divided into a nitrogen, a phosphate, a potash, a cotton-seed meal, a salt, and a copper sulphate series. A table reports the yield obtained on each plat in 1910–11 and the 7-year average. The highest yield followed an application of nitrate of soda, sulphate of potash, and basic slag, but yields almost as high followed applications of (1) sulphate of ammonia, sulphate of potash, and basic slag, (2) sulphate of ammonia, sulphate of potash, and a larger amount of basic slag, (3) basic slag and cotton-seed meal, and (4) sulphate of potash, basic slag, and cotton-seel meal. Tables also report the yields and quality of tree cotton.

Reports on the botanic station and experiment plats, Montserrat, 1910–11, F. WATTS (*Imp. Dept. Agr. West Indies, Rpts. Bot. Sta. [etc.] Montserrat, 1910–11, pp. 1–21*).—Reports of the results of spinning trials and cotton improvement by selection are followed by a brief discussion of germination tests with cotton seed.

During a severe attack of cotton stainers the lint was discolored and weakened while the seed in the bolls attacked had a germinating power of 21 per cent as compared with 90 per cent in case of bolls not attacked. Seed protected during the development but exposed to the feeding of insects after harvesting showed no effect on germinating power.

Bengal beans (*Stizolobium aterrimum*) when allowed to cover lime trees until November 22 effectively freed them from green scale (*Coccus viridis*) and purple scale (*Lepidosaphes beckii*), but when removed from the tree September 20 the scale was not completely eradicated.

Variety tests of peanuts and sweet potatoes are also reported.

Report on the results of rotation experiments in the counties of Northumberland and Durham, D. A. GILCHRIST (*Newcastle-upon-Tyne, 1911, pp.*

7).—This is a report on the fourth rotation of a series begun in 1894, consisting of swedes, barley, hay, and oats. The results obtained at 2 points are stated in full, including the yields obtained after applications of various amounts and combinations of natural and artificial fertilizer.

The application of 12 tons of dung per acre to swedes in drills at the time of sowing was followed by higher yields than when commercial fertilizers were added to this application, particularly if the previous hay crop had received a phosphate as basic slag. Nitrogen for the barley crop proved undesirable since it caused lodging. A potash fertilizer gave excellent results when only commercial fertilizers were used.

How to raise the yields of summer cereals in Novo-Russia, K. G. Mankovski (*Abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, pp. 399, 400*).—Neither the application of manure nor increasing the depth of plowing from 3½ to 10 in. increased the yield of cereals, but early and shallow replowing proved of considerable benefit.

The roots of some North African desert grasses, S. R. Price (*New Phytol., 10 (1911), No. 9–10, pp. 328–340, pl. 1, figs. 2*).—These pages state the results of anatomical and physiological studies of the roots of *Aristida pungens*, *A. obtusa*, *Lygum spartum*, *Bromus tectorum*, and other North African desert grasses. Adhering sand particles which formed a sheath to the roots and interfered with section cutting were dissolved with dilute hydrofluoric acid.

Report on an experiment on the cultivation of lucern in Scotland and on the effects of inoculation, 1905–1909, R. P. Wright (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 157–170*).—The author found that alfalfa grew quite successfully on a cold clay soil in the wet, smoky climate of Glasgow, but must not be sown with a nurse or companion crop. Seeding in rows for cultivation proved desirable. The application of nitrate of soda and inoculation with bacterial cultures proved equally effective in increasing the yield but the latter was more economical.

Variety test of corn and cotton, 1911, M. V. Calvin (*Georgia Sta. Circ. 67, pp. 2*).—In a test of 17 varieties of corn Vallenweider Blend, Harley Improved, and Whatley Improved produced 25 bu. or more of shelled corn per acre each. Vallenweider Blend stood second in shelling percentage and smallness of number of ears required to make a bushel of shelled corn.

In a test of 28 cotton varieties McElhenny Cleveland and Wannamaker Cleveland produced over 1,700 lbs. of seed cotton per acre each and had 99.5 and 97.2 per cent, respectively, of the cotton picked by October 3.

An improved method of artificial pollination in corn, G. N. Collins and J. H. Kempton (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 89, pp. 7, figs. 2*).—Directions are given for insuring self-pollinated seed by the use of strong paper tubes about 4 in. in diameter and 40 in. long which lead from the tassel to the ear to be fertilized.

Papers and reports on cotton cultivation, W. R. Dunstan (*London: Internat. Assoc. Trop. Agr. and Colon. Development, 1911, pp. VIII+320, pl. 1*).—This is supplementary to a report already noted (E. S. R., 25, p. 233). It is made up of the papers submitted by the cotton authorities of different countries and presented to the International Congress of Tropical Agriculture, Brussels, May, 1910.

Suggestions on growing Egyptian cotton in the Southwest, C. S. Scofield (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 717, pp. 10*).—Directions for the production of Egyptian cotton in the Southwest are followed by a statement of the advantages of cooperation in shipping, marketing, ginning, baling, seed production, and the exclusion of Upland and other types of cotton.

Flax growing, A. KEYSER (*Colorado Sta. Circ. 11, pp. 8*).—A discussion of the soil requirements of flax with special reference to Colorado conditions is followed by directions for producing the crop in that State.

Potato experiments, 1910–11, G. VALDER (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 879–881*).—Approximately equal yields of potatoes followed applications of (1) 8 cwt. dried blood, 8 cwt. superphosphate, and 4 cwt. sulphate of potash, and (2) 4 cwt. sulphate of ammonia, 13 cwt. superphosphate, and 3 cwt. sulphate of potash, each applied at the rate of 4 cwt. per acre. Tests of 11 varieties in a number of districts are also reported.

Experiments with potatoes, 1910, W. BRUCE (*Edin. and East of Scot. Col. Agr. Rpt. 24, 1911, pp. 10*).—These experiments are a continuation of those previously noted (E. S. R., 23, p. 236).

Potatoes brought from Banffshire and planted in Fifeshire showed remarkable vigor and in the following year the superiority of the seed originally from Banffshire was still very apparent. Up-to-date potatoes secured from 3 other sources considerably excelled in yielding power those grown in East Lothian, but the Langworthy variety apparently lost vigor when brought to the higher elevation. The results of fertilizer and spraying tests are also reported.

Report on experiments on the manuring of potatoes in 1907 and 1908, R. P. WRIGHT (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 107–132*).—These experiments were conducted in 1907 on 17 different farms and in 1908 on 14 farms in central and southwest Scotland. They tested farmyard manure, superphosphate, sulphate of ammonia, sulphate of potash, basic slag, sulphate of iron, potash manure salt, nitrogen lime, nitrate of lime, and nitrate of soda, either singly or in various combinations and in various amounts.

The author concludes that the most successful and profitable mixture of commercial fertilizers when used in conjunction with 10 tons of farmyard manure per acre was 1½ cwt. sulphate of ammonia, 1½ cwt. sulphate of potash (94 per cent pure), 3 cwt. superphosphate (30 per cent soluble), and sufficient basic slag to contain as much citric-acid soluble phosphoric acid as is contained in 3 cwt. of superphosphate. This mixture produced a larger and more profitable yield than a similar one in which only 1 cwt. of sulphate of ammonia was used, or another in which all the phosphate was applied as superphosphate. Neither the 30 per cent potash manure salt nor muriate of potash equaled the 94 per cent pure potash manure. Calcium cyanamid, when used in quantities supplying no more nitrogen than that contained in 1 cwt. sulphate of ammonia, appeared even more effective than the latter on some farms, but distinctly inferior on others. During 1 year nitrate of lime gave results almost equal to those which followed the use of sulphate of ammonia. Nitrate of soda and sulphate of ammonia gave practically equal increases in the yield of the potato crop.

Tables state in detail the yields of diseased potatoes and of potatoes of different sizes obtained by the use of each of the fertilizer applications at each of the farms during the 2 years of the test. Smaller tables summarize the effect of the use of farmyard manure in large and small applications, both alone and with commercial fertilizers, and compare basic slag and superphosphate. Potash manure salt is also compared with sulphate of potash, muriate of potash with sulphate of potash, and nitrogen lime with sulphate of ammonia and with nitrate of soda.

Literature on the races of rice in India (*Agr. Ledger, 1910, No. 1 (Veg. Prod. Ser., No. 113), pp. 335–594*).—This is the concluding portion (L–Z) of the index previously noted (E. S. R., 25, p. 236).

[**Green manuring for swedes**], P. MCCONNELL (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 2, pp. 102–104*).—Each of the 4 plats in this test was green manured, and 3 of them were given additional fertilization with bone dust,

slag, superphosphate, sulphate of potash, and sulphate of ammonia in various mixtures.

The plat which received no commercial fertilizer had almost as good an appearance as the fertilized plats. Among the fertilized plats the lowest cost of gain per ton followed the use of 2 cwt. of basic superphosphate and ¼ cwt. of sulphate of potash per acre. Swedes remained perfectly sound although growing side by side with kohl-rabi badly diseased with club root.

[Variety and manurial tests of mangels], P. McConnell (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 2, pp. 107, 108*).—In a test at the Moumahaki farm of 3 different mixtures of basic slag, kainit, and basic superphosphate, the highest yield of mangels followed the application of 2 cwt. basic superphosphate and ¾ cwt. of kainit per acre. A cross-dressing of ½ cwt. of sulphate of ammonia had no apparent effect on any of the plats.

On the influence of the arrowing of the sugar cane on the production, R. A. Quintus (*Internat. Sugar Jour., 13 (1911), No. 152, pp. 431–434*).—In this experiment the samples averaged 100 canes each and "were so taken that one arrowing and one nonarrowing cane were alternately picked from 50 stools. The canes were cut as far under the ground as possible, the nonarrowing varieties being pruned exactly at their vegetation point; while from the arrowing specimens all spongy joints were removed." The numerical data obtained is stated in full. The author concludes that in case of the early ripening varieties "no harmful influence of arrowing can be established; while with the late ripeners, on the other hand, there is a loss in the production of sugar."

The sugar industry in the island of Negros, H. S. Walker (*Manila: Dept. Int. Bur. Sci., 1910, pp. 145, pls. 11*).—This is a compendium of information on sugar growing in the island of Negros. A discussion of the physiography of the island is followed by notes on the status of cane growing, the principal sugar-producing districts, soils and canes, directions for producing, harvesting, and manufacturing the crop, suggestions for improvements in the cultivation of sugar cane, and the manufacture of sugar in the island.

Report on experiments on the manuring of turnips in 1906 and 1907, R. P. Wright (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 133–155*).—These experiments were conducted on 16 farms in 1906 and 20 farms in 1907 in the central and southwest counties of Scotland.

The author concludes that potash is an essential fertilizer but that nitrogen is less important. A 30 per cent potash manure salt proved as effective as kainit in supplying potash. Phosphoric acid applied half in the form of superphosphate and half in the form of basic slag produced as large a crop as when applied entirely in the form of superphosphate. Better results were obtained by applying nitrate of soda in drills than as a top-dressing, but this appeared to vary with the season. Lime nitrogen appeared to be as valuable a source of nitrogen as either nitrate of soda or sulphate of ammonia, and on soils to which it was adapted it appeared capable of giving better results.

Tables give in detail the yields obtained at each farm by the use of each of the 12 mixtures of superphosphate, basic slag, sulphate of ammonia, nitrate of soda, and kainit tested, and other tables summarize comparisons of various fertilizers.

Wheat fertilizer trial, Cowra Experiment Farm, 1910, F. Ditzell (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 845–849*).—In a test of bone dust, superphosphate, rock phosphate, bone charcoal, and Thomas phosphate as phosphorus sources, each used in conjunction with other commercial fertilizers, the yield of wheat was apparently increased somewhat by the use of phosphates, but less than 10 per cent variation was observed on various plats. The rock phosphate plat produced a lower yield than the check plats.

Wheat fertilizer trial, Wagga Experiment Farm, 1910, R. W. McDiarmid (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 849–851*).—In a phosphate test similar to the above slight increases in yield apparently followed the use of all the phosphates except Thomas phosphate.

Wheat Fertilizer trial, Bathurst Experiment Farm, 1910, R. G. Downing (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, p. 852*).—In a phosphate test similar to those noted above the most advantageous results apparently followed applications per acre of (1) 63 lbs. of bone dust and 29 lbs. sulphate of potash, and (2) 21 lbs. of blood, 50 lbs. bone charcoal, and 29 lbs. of sulphate of potash.

Cooperative field experiments.—Testing wheat, A. MacPherson (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 1, pp. 11, 12*).—In a fertilizer test each plat treated with superphosphate alone showed a lower wheat yield than the check plat, but when (1) nitrate of soda and gypsum or (2) sulphate of potash and gypsum were applied with 1 cwt. of superphosphate per acre there was a slight increase in yield.

The results of a test of 5 varieties are also stated.

[Variety and fertilizer tests of wheat], A. MacPherson (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 5, pp. 388–390, figs. 2*).—Each of the 5 applications of superphosphate in various quantities with or without sulphate of potash, nitrate of soda, or gypsum, was followed by a smaller yield of wheat than was secured upon the check plat.

The results of a test of 6 varieties are also reported.

Report on the storage and handling of grain in Europe, United States of America, and Canada, T. R. Price (*Pretoria: Govt., 1911, pp. V+76, pls. 12*).—This is a summary of data on the storing and handling of grain, its movement in commerce, and its utilization.

Characteristic weeds on cultivated marsh soils, E. Haglund (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 3, pp. 238–245*).—This article reports observations on the weeds that will be found on marsh soil cultivated under different conditions and by different methods.

The weed situation, A. L. Stone (*Rpt. State Conserv. Com. Wis., 1911, pp. 60–67*).—These pages report data obtained from 499 replies to circular letters.

"Of the 499 farmers 228 report quack grass with an average area of 3.32 acres; 262 Canada thistles with an average of 5.6 acres; 112 wild mustard with an average of 20.5 acres per farm; and other weeds in gradually lessening areas." In a weed census taken by a farm to farm canvass in 5 counties selected as typical sections of the State, the total area of the 404 farms visited was 60,025 acres, of which 3,073.03 acres were seriously infested with noxious weeds.

Weed pests of Idaho and methods of eradication, O. M. Osborne (*Idaho Sta. Bul. 71, pp. 36, figs. 17*).—This bulletin deals with a number of the worst weeds with which the Idaho farmer has to contend. A description of each is followed by a statement of the method or methods of eradication suggested.

The extermination of thistles, W. Brückner (*Ztschr. Landw. Kammer Schlesien, 15 (1911), No. 24, pp. 750, 751*).—The author gives the results of his attempts to kill thistles by spraying with strong acids, etc. He describes the apparatus used, which he claims is applicable to the plants individually and is effective, economical, and safe.

HORTICULTURE.

Vegetable gardening, R. L. Watts (*New York and London, 1912, pp. XIII+511, figs. 110*).—This is a treatise prepared to meet the demands of instructors desiring a text-book on vegetable gardening as well as to present in

organized form data of value to all classes of vegetable growers. Consideration is given to the fundamental principles involved in the various operations of vegetable gardening, and cultural methods are discussed in detail, with frequent references to the practices of vegetable growers in various sections of the United States and Canada.

The subject matter is based upon the author's own experience and observations, as well as on the literature on vegetable gardening.

Vegetable growing (*Mass. [Bd.] Agr. Bul. 5, 1911, pp. 142, figs. 14*).—A compilation of articles on the culture of different vegetables, some of which have previously appeared in different publications of the Massachusetts State Board of Agriculture, and others being adapted from Farmers' Bulletins of the U. S. Department of Agriculture.

The production of the Lima bean: The need and possibility of its improvement, G. W. SHAW and M. E. SHERWIN (*California Sta. Bul. 224, pp. 201–246, figs. 28*).—In this bulletin the Lima bean is considered relative to its classification, description, nativity, geographical distribution, and limiting factors. The industry as conducted in California is then described in detail, after which the authors discuss the need and possibility of improvement, the desirability of better selection, and suggest a practical plan of seed improvement.

The special improvements desirable in the Lima bean here noted are early maturity, and increased yield, hardiness, and quality. A plan of improvement undertaken in 1908 cooperatively with several growers, together with the results thus far secured, is described. Thus far a number of promising strains showing prepotency in high yield have been developed and seed from the more desirable ones is now being increased.

Garden management, II, A. G. B. BOUQUET (*Oregon Sta. Circ. 14, Veg. Growing Ser. 2, pp. 9*).—In continuation of a previous circular (E. S. R., 25, p. 38), this contains a popular discussion of the cultivation and irrigation of vegetables, including notes on the culture of tomatoes, celery, lettuce, radishes, spinach, peas, squash, and cucumbers for market and for exhibition.

Insecticides for the gardener, H. F. WILSON (*Oregon Sta. Circ. 14, Crop Pest Ser. 4, pp. 4*).—Popular directions are given for controlling insects attacking vegetables and small fruits.

Calendar for the treatment of plant diseases and insect pests, W. J. GREEN, A. D. SELBY, and H. A. GOSSARD (*Ohio Sta. Bul. 232, pp. 23–52, figs. 3*).—This is a revised edition of Bulletin 199 of this station (E. S. R., 20, p. 1055). The methods described include treatments of seed and soil, as well as the use of sprays and spraying machinery.

Spray calendar, F. W. FAUROT (*Missouri Fruit Sta. Circ. 5, pp. 6*).—This comprises a spray calendar for apples and for peaches and other stone fruit, including directions for making Bordeaux, the lime-sulphur sprays, and arsenate of lead.

Horticulture; model orchard reports; nursery inspection report, H. A. SURFACE (*Bi-Mo. Zool. Bul. Penn. Dept. Agr., 2 (1912), No. 1, pp. 44*).—This bulletin contains instructions relative to pruning and the treatment of various orchard pests during the dormant period, together with reports of expenditures and receipts of the cooperative model orchards (E. S. R., 24, p. 149) and a report on nursery inspection work for the season of 1911.

A comparative test of fuel oils and appliances used in orchard heating to prevent frost injury, P. J. O'GARA (*Medford, Oreg., 1912, pp. 28, figs. 3*).—The comparative test which is reported in detail was conducted in the Rogue River Valley. The object of making the test was to compare the behavior of a

number of fuel oils, including stove distillate, slop distillate, Richmond smudge oil, and crude oil when burning in various types of smudge pots. The data are presented in tabular form and the results are summarized.

Parthenogenesis among fruit blossoms as a protection against damage from frost and insects, R. EWERT (*Ztschr. Pflanzenkrank., 21 (1911), No. 4, pp. 193–199*).—In continuation of previous investigations of parthenogenetic fruit (E. S. R., 24, p. 340), the author studied 2 varieties of pears with special reference to the influence of frost and insect attacks on the fruitfulness of parthenogenetic blossoms.

From the data secured the conclusion is drawn that for varieties of fruit which have particular parthenogenetic tendencies, fruiting is not materially interfered with by either frost or insect attack. With such fruit as apples, among which parthenogenesis is not so frequent, the breeding of new varieties possessing this characteristic is recommended.

Apples of the colder regions of the United States and Canada, W. T. MACOUN (*Cornell Countryman, 9 (1912), No. 5, pp. 135–137*).—A brief account of the varieties of apples which have originated in and have proven adapted to the colder parts of the United States and Canada.

An apple orchard survey of Ontario County, HARRIETT M. MARTIN (*New York Cornell Sta. Bul. 307, pp. 163–215, pl. 1, figs. 10*).—This bulletin reports the fourth of a series of orchard surveys being made of the apple-growing counties of New York (E. S. R., 23, p. 538). The field work was conducted under the supervision of C. S. Wilson and the task of collating and tabulating, as well as drawing conclusions from the data, was executed by the author. An appendix contains a discussion of statistical methods as applied to orchard surveys, and a brief bibliography relating to statistical methods.

The complete survey consisted of 391 orchards covering an area of approximately 2,700 acres. Owing to incomplete returns secured in many instances, however, the results are tabulated from 3 different groupings of orchards. Group 1 comprises the data on 161 orchards for which complete returns of yield and income for the years 1904 to 1907 inclusive were recorded. With this group as a basis, deductions are made relative to the influence of the various factors in orchard condition and management on yield and income per acre. In group 2 are included the available data from the 391 orchards concerning the distribution of orchards and general orchard management. Group 3 consists of 315 orchards for which yield and income were reported for 1907 and 1908.

The 4-year average yield for group 1 is 58.4 bbls. per acre and the 4-year average income $111.51. Less than 50 per cent of the orchards produced more than 60 bbls. or more than $120 per acre. The smaller orchards ran higher in both yield and income than the general average, while the larger orchards ran below. Orchards which have been kept in good condition gave the best results. Orchards situated on level ground gave the highest yield and income, while those sloping to the west were the lowest in the scale. Within the range of elevation included (500 to 1,100 ft.) there appeared to be no relation between the elevation and the yield and income. About 79 per cent of the orchards contained trees 30 years old or more and 14 per cent were 50 years old or more. The greatest 4-year average yield occurred in the group of orchards between 25 and 29 years of age, which produced 65.3 bbls. per acre. Trees between 40 and 44 years of age gave the best 4-year average income of $128.15 per acre. The low yield and income from old trees is attributed chiefly to neglect of various kinds.

The chief commercial varieties planted in the county are Baldwin, Rhode Island, Northern Spy, Tompkins King, and Roxbury. Practically all of the

orchards are planted either on the square or rectangular plan at a typical distance of 33 by 33 ft. Less than 24 per cent of the orchards were well pruned. The chief method of pruning is to thin out the trees a little every year. The chief soil types are the gravelly and sandy loams, the highest yield being produced on the latter. Sixty-four per cent of the orchards were either wholly or partly tile drained. Natural drainage gave the highest yield and income. Orchards in sod were the general rule but the highest yield was produced by orchards tilled 5 years or more. As a rule sod orchards were not pastured, but those pastured with hogs and sheep gave the highest returns.

Stable manure was used by 76 per cent of the growers, either alone or in combination with commercial fertilizer or cover crops. The latter were not very generally used. Stable manure applied at the rate of from 10 to 15 loads per acre every year or from 15 to 20 loads every other year resulted in high yields and incomes of about $147 per acre, as compared with an income of $71.54 per acre for unfertilized orchards.

The chief orchard pest reported was the blister mite which was found in 305 orchards. The codling and tussock moths were the chief chewing insects. Of plant diseases canker and twig blight were the most troublesome. Practically half of the orchards were essentially unsprayed. Bordeaux was the chief spray mixture used, less than one-third of the orchardists using arsenical poisons and only about 6 per cent using such sprays as lime and sulphur to combat sucking or scale insects. The unsprayed orchards gave a 4-year average income of $67.66 and the orchards sprayed 3 times gave an average income of $140.26 per acre.

As summarized in the preface by J. Craig, under whose direction the surveys have been conducted, the results as a whole prove that profits are secured largely in proportion to the application of intelligent, up-to-date methods. Spraying, fertilizing, and cultivation appear to be indispensable to the fullest returns.

Vermont, an apple growing State (*Vt. Agr. Bul. 11, 1911, pp. 31, pls. 4*).—This is a popular bulletin, prepared by M. B. Cummings, relative to apple growing in Vermont. The apple districts of the State are described and consideration is given to varieties, planting operations, pruning, tillage, cover crops, orchard enemies, orchard renovation, educational factors, and the future of the industry.

[The Ray peach] (*New England Homestead, 63 (1911), No. 25, p. 565, fig. 1*).—This peach, which was fruited in Connecticut for the first time in 1911, is here illustrated and described.

Small fruits and berries (*Mass. [Bd.] Agr. Bul. 4, 1910, pp. 113, pls. 2, figs. 2*).—This comprises a compilation of a number of articles dealing with the culture of orchard and small fruits, which have previously appeared in bulletins of the Massachusetts State Board of Agriculture.

The cost of producing oranges in California, G. H. Powell (*Citrus Protec. League, Cal., tables 5*).—Tabular data are given showing the detailed cultural cost of producing oranges in California in 1910 for 271 groves, comprising 8,095.9 acres. The data do not include depreciation or interest on the investment. Superintending and administration are included only when actually paid for.

The average results show an expenditure of $136.06 per acre from the beginning of the season until harvesting. Of this amount $83.24 was expended for materials and $52.82 for labor. The average yield for the 5-year period, 1906–7 to 1910–11, was 157.6 packed boxes per acre. The cultural cost was 86.33 cts. per box and the cost of picking, hauling, and packing was 43.04 cts. per box.

The average wholesale cost, including transportation and marketing charges, was $2.2706 per box, or 18.1 cts. per dozen.

The cacao of the world (*Bul. Pan Amer. Union, 34 (1912), No. 1, pp. 75–85, figs. 9*).—A brief general account, including statistics of the world's production and consumption of cacao beans for 1911 with total statistics of the production and consumption for the previous 8 years. The estimated total production in 1911 was 275,795.46 tons and the estimated total consumption 255,954.06 tons.

A method of budding the walnut, E. J. KRAUS (*Oregon Sta. Circ. 16, pp. 8, figs. 7*).—The author describes the use of the shield and of the flute bud methods as adapted to the propagation of walnuts. In making the incision of the stalk an I-shaped cut from which is here derived the term "hinge" bud has been found more successful than either a T or an inverted T cut. Instead of taking buds of the current year's growth, as is commonly done in propagating the walnut, the use of dormant 1-year-old buds taken from the base of the current year's growth has been found to give much better results.

Classification of the peony, L. D. BATCHELOR (*New York Cornell Sta. Bul. 306, pp. 55–159, pls. 4*).—This comprises the fourth report on the peony investigations being conducted by the Cornell Station in cooperation with the American Peony Society.

Since the last report (E. S. R., 23, p. 541) many additional varieties have been identified and a large number of synonyms established. Lists are given of varieties suitable for cut flowers and landscape or border planting, together with additional notes and corrections to previous descriptions, and a list of synonyms. The varieties observed in 1910 are described in detail relative to their type, color, species, characters of bloom and of plant, and commercial value. An index to the variety descriptions in the various reports is appended.

Although a few prominent varieties are still missing from the trial plats, it is believed that the classification thus far made contains at least 95 per cent of the important commercial varieties.

FORESTRY.

The forest, its rôle in nature and society, A. JACQUOT (*La Forêt, son Rôle dans la Nature et les Sociétés. Paris and Nancy, 1911, pp. XX+324*).—This work comprises as a whole a course of lectures on forestry adapted for the use of regular lecturers and others speaking in the interests of conservation and reforestation. In part 1 are grouped together subjects relating to forestry from an economic standpoint. Part 2 deals with the physical rôle of the forest, and part 3 treats of the forest in relation to social problems. In addition to the regular chapter divisions, the subject matter is also divided into lectures.

A bibliography is included.

Forestry (*Colon. Rpts., Ann. [Gt. Brit.], No. 695, 1911, pp. 10–15*).—A short progress report on forest operations in Southern Nigeria in 1910, including data relative to alterations in area, regeneration of forests, exploitation of major and minor forest products, and financial returns for the year.

Report on scenery preservation for the year 1910–11, W. C. KENSINGTON (*New Zeal. Dept. Lands, Rpt Scenery Preserv., 1910–11, pp. 6, pls. 6*).—This comprises a progress report on the acquirement and reservation of lands under the New Zealand scenery-preservation act. Descriptive notes are given of some of the principal reservations, together with a financial statement for the year.

Report on state afforestation in New Zealand for the year 1910–11, W. C. KENSINGTON (*New Zeal. Dept. Lands, Rpt. State Afforest., 1910–11, pp. 74, pls.*

14).—Part 1 of this report explains the relation of the government to afforestation in New Zealand and shows the methods adopted in each island at the state nurseries and plantations. Part 2 comprises a progress report by the officers in charge of tree planting operations. The report is well illustrated and plans of each island are attached showing the locality of the various state nurseries and plantations.

The afforestation of sand dunes on the Hela Peninsula, SCHULTZ (*Mitt. Deut. Dendrol. Gesell., 1911, No. 20, pp. 82–92, figs. 4*).—A descriptive account dealing with sand binding and afforestation on the Hela Peninsula in West Prussia.

Forest planting in the northeastern and lake States (*U. S. Dept. Agr., Forest Serv. Circ. 195, pp. 15, fig. 1*).—This circular has been revised to supersede Forest Service Circular 100 (E. S. R., 19, p. 147).

The planting suggestions contained herein are applicable to the New England States, New York, northern New Jersey, all of Pennsylvania, western Maryland, the high plateau region of West Virginia, and the higher portions of the Appalachians south of it, and to Michigan, Wisconsin, and eastern Minnesota.

Forest nursery stock for distribution in the spring of 1911, A. F. HAWES (*Vermont Sta. Circ. 6, pp. 8, pls. 4*).—This circular continues previous announcements (E. S. R., 24, p. 447) and contains brief cultural notes on trees recommended for planting, information relative to prices and methods of procuring state nursery stock, directions for planting, and estimates on the cost of planting. Cultural suggestions are also given relative to the transplanting of seedlings into private nurseries.

The influence of age and condition of the tree upon seed production in western yellow pine, G. A. PEARSON (*U. S. Dept. Agr., Forest Serv. Circ. 196, pp. 11*).—The results are given of a study made in 1909 relative to the conditions affecting the germinative quality of seed of the western yellow pine (*Pinus ponderosa*) growing in Arizona at an elevation of about 7,200 ft. Seed were collected from 100 trees representing different ages, sizes, and conditions of soundness, and general health. The data secured are presented in tabular form.

Examination of the data as a whole indicates that seed from very young trees has a higher germination than seed from old, mature, or overmature trees. Certain injuries appear to increase the germinative power while others decrease it. As compared with sound, healthy yellow pine, yellow pine affected by heart rot showed a 3 per cent increased germination percentage; yellow pine possessing spike tops showed a 15 per cent higher germination percentage, as did also pine marked by fire scars. Mistletoe infected trees, on the other hand, showed a germination 17 per cent below that of infected trees. The effect of suppression on germination was not clearly demonstrated. The highest quality of seed was produced in dense stands. The age and condition of the tree appeared to have no material effect upon the rate of germination.

An exact study of the factors influencing the yield of seed was not undertaken, but the data secured show the older trees to yield the most cones. Spike tops showed a yield only one-half as great as that given for healthy yellow pines, and the yield of trees suffering from suppression, attacks of bark beetles, and mistletoe were all much below that of normal trees of their class. The yield decreased as the density of the stand increased. The influence of basal burns upon yield was not fully demonstrated.

The circular concludes with suggestions relative to the application of the results in regeneration operations.

Progress report on wood-paving experiments in Minneapolis, F. M. Bond (*U. S. Dept. Agr., Forest Serv. Circ. 194, pp. 19, figs. 5*).—This circular gives the results obtained after 4 years of heavy traffic in a service test on wood paving blocks of various species laid in cooperation with the city of Minneapolis, Minn. (E. S. R., 19, p. 951).

From the results thus far secured the species used are tentatively grouped in order of their value for creosoted paving material as follows: (1) Longleaf pine; (2) Norway pine, white birch, tamarack, and eastern hemlock; (3) western larch; and (4) Douglas fir. At the beginning of the summer of 1911, nearly 5 years after laying the test pavement, the Douglas fir blocks were in such bad condition that it became necessary to re-lay this portion of the pavement. This was done partly with first-class Douglas fir paving stock and partly with regular southern yellow pine blocks.

Specifications of the city of Minneapolis for good paving block oil for the years 1906 and 1911, together with records of the treatment of the blocks made in 1911 and travel records for different years, are appended.

Dry rot investigations, IV (*Hausschwammforschungen, IV. Jena. 1911, pp. 95, figs 19*).—The present part of Hausschwammforschungen, edited by A. Möller (E. S. R., 23, p. 254), comprises a report of the fourth and fifth sessions of the Prussian Advisory Commission for investigations relative to dry rot; the results of tests made by Falck with various chemical solutions used for protecting wood from dry rot; and the following articles:

The prevailing methods for protecting timber used for pile work from fungus injury, Brüstlein (pp. 15–47).—This describes the methods of protecting the wood in the forest during transportation and at the sawmill, and includes painting, absorption, and impregnation processes.

The protection of construction timber from rot, H. C. Nussbaum (pp. 48–69).—This deals with methods employed during actual construction work.

Condensed water formation as a factor in the destruction of beam ends in exterior walls by wood-destroying fungi, R. Niemann (pp. 70–95).—A theoretical and technical discussion of this subject, including suggestions relative to improved methods of construction for the purpose of lessening the formation of condensed water and for protecting beam ends from decay.

Forest products of Canada, 1910.—Lumber, square timber, lath, and shingles, H. R. Macmillan, B. Robertson, and W. G. H. Boyce (*Dept. Int. Canada, Forestry Branch Bul. 25, 1911, pp. 39, figs. 2*).—The statistics here reported are based upon the reports of 2,763 firms operating nearly 3,000 sawmills. The data show the quantity and value of lumber, lath, and shingles used throughout the Dominion of Canada and its several Provinces, including also the quantity and value of the wood of each species used and square timber exported.

The lumber, square timber, lath, and shingles produced in Canada during 1910 had a total value of $83,989,197.

Manufacture and utilization of hickory, 1911, C. F. Hatch (*U. S. Dept. Agr., Forest Serv. Circ. 187, pp. 16*).—In continuation of a previous investigation of the commercial hickories in the United States (E. S. R., 24, p. 243) the Forest Service in cooperation with the National Hickory Association conducted an investigation to ascertain the present methods employed in the manufacture, marketing, and utilization of hickory with a view to suggesting improvements. The results of the investigation are embodied in this circular, including recommendations relating to a closer and better utilization of the hickory stumpage.

DISEASES OF PLANTS.

The symbiosis of bacteria with plants, H. Miehe (*Biol. Centbl., 32 (1912), No. 1, pp. 46–50*).—The author describes bacterial tumors found on the leaves of *Ardisia crispa* and *Pavetta* spp. in addition to those recently reported by Boas (E. S. R., 26, p. 451) on 2 species of Psychotria. There do not appear to be any symptoms of parasitism on the part of the bacteria, and the author believes the relation is one of symbiosis.

Pathological fungus forms, E. Voges (*Ztschr. Pflanzenkrank., 21 (1911), No. 4, pp. 207–213, figs. 5*).—The author describes and discusses certain abnormalities of form and habit observed in the development of certain cultures of *Septoria apii* and *Marssonia potentillæ* grown on substrata of plum and strawberry decoction and of gelatin. He considers the peculiarities as pathological and accidental, being expressions of the artificial nature of the substratum. He does not explain the fact that he found abnormalities resembling some of these in Marssonia growing naturally on leaves of its proper host, *Potentilla anserina*.

Intumescences in Araliaceæ, P. Sorauer (*Ztschr. Pflanzenkrank., 21 (1911), No. 6, pp. 336–341, fig. 1*).—The author made a careful study of the distortions, discolorations, and cell changes in the leaves of *Aralia sieboldi*, *A. palmata*, *Panax arboreus*, and *Hedera helix*, but was not able to state any regular relation between these abnormalities and the organisms found in connection therewith.

Study of fungi on Lolium, J. Fuchs (*Hedwigia, 51 (1911), No. 5, pp. 221–239*).—The author gives an account of his investigations on the relations of Lolium as host to certain fungi parasitic or symbiotic thereon.

Attempts to obtain the fungus from the host directly by means of cultures from small portions of the mycelium-containing aleurone layer of infected embryos resulted in the separation of 2 different fungi, a Pleospora and a Fusarium. By utilizing the fact pointed out by Stingl that an embryo of one species can be made to grow on the endosperm of another, it was found that in almost every case where the transferred embryo failed to grow, Fusarium developed, apparently of the same species that had already been obtained by the separating process mentioned, but now living not as a parasite but saprophytically.

The author holds that these results support the view that the normal life of the fungus is here really symbiotic rather than parasitic. Fungus-free Lolium seeds inoculated with the fungus separated as above appeared after from 2 to 4 weeks to have been penetrated by the fungus.

Combating stalk disease of rye (Tylenchus dipsaci) in Westphalia, A. Spieckermann (*Landw. Jahrb., 40 (1911), No. 3–4, pp. 475–515; abs. in Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 23–25, pp. 600–603*).—After giving a brief history of this nematode disease the author presents an account of the investigations carried on looking to its control. The experiments were conducted mainly in sandy soils, more or less loamy, and of varying fertility in a region where rye is the leading crop, especially on the lighter soils.

The industrious removal of the infected plants produced but little improvement in seriously infected fields. Disinfection was found practicable only on small spots of recent infection. Carbon disulphid, mixed carbolic and sulphuric acids, and in a degree petroleum, have been found efficacious in this connection. On weak soils the improvement of nutrition on application of proper fertilizers, specifically nitrate of soda, has been found to check the disease. No marked influence of seed time on the disease can be stated, except that early plantings following mild winters suffer more than late sowings, while late seed-

ings after hard winters are more in danger than early ones. Turning under the surface mold to a depth of 30 cm. reduces considerably the number of plants attacked. Drill cultivation did not tend to reduce the attacks, but the plants individually withstood the attacks better. Rotation proved ineffective, as a number of the crops most grown in that region are attacked by the nematode. These include, besides rye of both winter and summer varieties, oats and buckwheat. Barley, clover, and other plants suffer but little, if at all.

Control of loose smut of wheat (Ustilago tritici) and of barley (U. nuda), O. APPEL and E. RIEHM (*Arb. K. Biol. Anst. Land u. Forstw., 8 (1911), No. 3, pp. 343–426, pl. 1, figs. 2*).—Continuing their communications under this head (E. S. R., 25, p. 453) the authors submit a rather elaborate report, giving a brief history of investigations on these destructive fungi and on means and methods employed for their control. Special attention is given to the application of heat to the seed grain through the medium of air and water. Various forms of apparatus tested are discussed and recommendations given as to kinds preferred and also as to temperatures to be employed and their duration; these are (in the principal treatment) for water a temperature of 50 to 52° C. maintained for from 7 to 10 minutes, and for air 50° for 5 minutes only.

Cabbage disease in Langendijk, J. RITZEMA BOS and H. M. QUANJER (*Tijdschr. Plantenziekten, 16 (1911), No. 4–6, pp. 101–148, figs. 2*).—The authors give the results of a 10 years' study of local diseases affecting varieties of *Brassica oleracea* and of means for their control. The diseases in question include those due to bacteria and fungi, among which are mentioned *Pseudomonas campestris* (black rot) and *Phoma oleracea;* those due to insects; and those due to unfavorable soil conditions. Safeguards and remedies are discussed in some detail and recommendations made as to means and methods of application.

The brunissure of cotton in Algeria, A. MAIGE and G. NICOLAS (*Bul. Soc. Hist. Nat. Afrique Nord, 2 (1910), No. 4, pp. 65–68*).—The authors describe a disease of cotton to which the name brunissure is given and which has proved somewhat destructive in parts of Algeria. It causes a premature falling of the leaves and bolls, and its presence is largely indicated by the roughened, brown, warty condition of the leaves, which bear spots with grayish centers surrounded by violet.

An examination of the lesions failed to reveal the presence of any parasite whatsoever. The palisade parenchyma and the spaces between were much thickened in the affected areas. The authors think the disease is due to physiological causes, such as sudden variation in temperature, humidity, etc., agreeing in this respect with the claim of Ducomet regarding brunissure of grapes (E. S. R., 12, p. 260).

Control of blackleg disease of the potato, W. J. MORSE (*Maine Sta. Bul. 194, pp. 201–228, pl. 1*).—In a previous publication (E. S. R., 23, p. 248), the author discussed the character, appearance, distribution, and economic importance of the blackleg disease of the potato.

This disease has been investigated extensively in Europe and is attributed to a number of different species of bacteria. For the purpose of the present report the author considers blackleg a type characterized by the blackening of diseased tissues rather than a term applied to a single disease caused by a specific organism.

Investigations on the control of the disease have been carried on in which tubers were submitted to drying, exposure to sunlight, various fungicides, etc. Drying and exposure to sunlight were found to kill the organisms, and the treatment of the tubers with disinfectants was followed with good results.

A series of cooperative experiments is reported upon in which seed tubers sufficient to plant 142 acres were treated, formaldehyde solution being used for those required for planting 88 acres and formaldehyde gas for 54 acres. The results as a whole indicate that preventive measures are exceedingly efficient. Where the seed tubers were selected and treated the disease was absolutely eliminated, and where the seed was treated with formaldehyde solution or gas there was considerable reduction in the proportion of diseased tubers.

Field observations extending over 5 years indicate that the disease is not carried over in the soil, but is transmitted by the tubers.

It is recommended that tubers, where used for seed purposes, be treated with formaldehyde, the solution being used where small quantities are to be treated, and the gas where the treatment is to be made by seed dealers or others who have a considerable amount of stock to be grown. Observations made in the cooperative experiments described above showed that the treatment did not affect the vigor of plants when properly applied, nor was there any indication of a stimulating effect similar to that attributed to etherization. The result of better stand and growth is attributed to the freeing of seed pieces from bacteria and fungi which might attack them and set up an early decay.

On tumor and canker in potato, A. S. Horne (*Jour. Roy. Hort. Soc., 37 (1911), No. 2, pp. 362–389, pls. 9*).—A discussion is given as to the proper identification of the fungus causing the black scab or tumor of potatoes, and attention is called to the apparent fact that 2 diseases, one caused by *Chrysophlyctis endobiotica* and the other by *Spongospora solani*, are very commonly confused. The author believes from the evidence at hand that the transfer of Chrysophlyctis to Synchytrium is not warranted. For the disease due to Spongospora the name potato canker is preferred, and for the other disease potato tumor or black scab is considered the more distinctive name.

A bibliography of the subject is appended.

Bacterial fibrovascular disease and leaf-roll disease of the potato, A. Spieckermann (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. 1–19, 173–177; abs. in Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 23–25, pp. 598–600*).—This is an extension of previous work (E. S. R., 23, p. 744) in which the author after reviewing briefly work previously done and the views held by others in regard to the relations of these 2 diseases presents details of his own later investigations as to the migration of material from the tuber during the vegetative period, the results of which may be briefly stated as follows:

As regards consumption of organic materials no differences were observed between the diseased and the sound plants. On the other hand, the ash material was carried more rapidly and completely from the tubers of sound than from those of diseased plants to the above-ground portions. Nevertheless, the ash content of the above-ground portion of diseased plants was higher than that of the sound plants. The transfer of nitrogen compounds was less rapid and less complete in case of sick than of sound plants, and the nitrogen content of the above-ground portions of sound plants was greater than that of diseased ones. The simplest explanation for the persistence of the diseased seed tubers is that in plants which produce limited quantities of dry substance the salts and nitrogen compounds of the seed potatoes can not be utilized, and, therefore, these remain in the sick tubers, which thereby can survive longer.

Biochemical researches on the leaf-roll disease of the potato.—II, The oxidases of resting and sprouted tubers, G. Doby (*Ztschr. Pflanzenkrank., 21 (1911), No. 6, pp. 321–336, figs. 5*).—Continuing investigations on the leaf-roll disease of the potato (E. S. R., 24, p. 552), the author claims to have found

in general that in the case of all of the 3 enzyms studied—oxygenase, peroxidase, and tyrosinase—the activity was greater in diseased than in healthy tubers.

Protection of tubers from potato disease by spraying with Bordeaux mixture, H. M. QUANJER (*Tijdschr. Plantenziekten, 17 (1911), No. 1–2, pp. 35–47*).—The author answers complaints from some sections to the effect that Bordeaux mixture was found to be ineffective or detrimental as regards the tubers, by giving observations and experiments of himself and several potato raisers, dealers, and investigators. He concludes that it is possible not only to protect the foliage from the disease, but also to keep it almost entirely from the tubers, and thereby to increase the value of the crop, by spraying with Bordeaux mixture in sufficient quantity before the warm wet weather releases the swarm spores and carries them down to infect the tubers.

Heterosporium variabile, its relation to Spinacia oleracea and environmental factors, H. S. REED and J. S. COOLEY (*Centbl. Bakt. [etc.], 2. Abt., 32 (1911), No. 1–2, pp. 40–88, figs. 9*).—Investigations were made on the disease called rust, affecting the nearly mature plants of the variety of spinach known as the Norfolk Savoy grown in the open fields about Hampton Roads, Va., during the winter months. This disease was found to be due to a fungus, *H. variabile*, and previous accounts of it have been noted elsewhere (E. S. R., 25, p. 846). The report thereon may be summarized as follows:

H. variabile is not a strong parasite, as is evidenced by its attacking only such plants as have been weakened or injured by other agencies, for example, leaf cutters, other parasites (among which may be named *Peronospora effusa*, *Macrosporium* sp., and *Phyllosticta chenopodii?*), acids, vapors, cold, unfavorable soil conditions, etc. Once inside the plant it ranges freely from cell to cell. The fungus seems to exert a positive toxic influence upon the cells of the plant, probably because of one or more of several enzyms found in the cultures.

Close study justified the name of the fungus by confirming its variability in form and habit. When first isolated it grows poorly as a saprophyte, but in the course of time, during which it undergoes changes of form and habit, it grows luxuriantly as a saprophyte. One of the most striking illustrations in the development of the fungus is the process by which the spores arise by budding either from hyphæ or from one another. The budding process appears to be uninfluenced by the acidity of the solution, by the presence or absence of oxygen, or by the dilution of the medium, and seems rather to be due to the conditions imposed by the saprophytic mode of life in artificial cultures.

Blight of the sugar beet and protection therefrom, D. HEGYI (*Ztschr. Pflanzenkrank., 21 (1911), No. 5, pp. 269–276*).—This most destructive disease, it is stated, appears to be due to the presence of one or the other of 2 fungi, *Phoma betæ* and *Pythium de baryanum*, or of certain soil bacteria. It may appear on plants from infected seed, or in case of infected soil may attack plants sprouted from perfectly healthy seed. The author found that in case of seeds, either artificially or naturally dried but containing only from 10 to 12 per cent of water, the plants on germination were entirely free from blight, and remained so even when the soil contained the bacteria and spores of the fungi. Seeds that contained 16 per cent of moisture, however, germinated more slowly and produced fewer and weaker seedlings, showing 17 per cent or more of blight, which soon spread to all the plants.

Drying the seed artificially is therefore urged, and strengthening the plants by appropriate fertilization and proper cultivation of the soil is also insisted upon.

The red rot of sugar cane, C. W. EDGERTON (*Louisiana Stas. Bul. 133, pp. 22, pls. 4*).—Some 2 years ago the author announced the discovery of the red rot of sugar cane due to *Colletotrichum falcatum* in Louisiana (E. S. R., 23,

pp. 450, 648). Since that time he has carried on studies on the organism and the effect it produces upon the cane, and has proved by inoculation experiments that the fungus is actually the cause of the disease.

The progress of the disease throughout the stalk is traced, and the fact that some varieties seem resistant is pointed out. In the previous account attention was called to the nearly related species of Colletotrichum which have been observed, and infection experiments were carried on with *C. lincola* and *C. cereale*, but without results. The various natural methods of infection are suggested and discussed, and it appears that infection commonly follows the attacks of the cane borer. It is usually stated that the red rot fungus passes from the diseased stalk to the young plant, but the author found no evidence to show that the young plants are infected by the fungus growing up into them from diseased seed. The injury to the plant and the losses due to the fungus are discussed, one of the principal effects of its presence being the reduction in the amount of sucrose and the gain in glucose in the infected plants.

For the control of the disease the author recommends the destruction of all diseased cane material and of the cane borer and more careful attention to the matter of selection of seed cane.

Notes on tomato diseases with results of selection for resistance, S. H. Essary (*Tennessee Sta. Bul. 95, pp. 12, figs. 7*).—A brief report of progress on the investigation of the blight disease of tomatoes in Tennessee is given.

This disease, which is well recognized by growers, is characterized by the yellowing of the lower leaves, followed in a few days by the wilting and dying of these leaves. Within a week from this time the whole plant may wilt and die. The blight, or wilt, as it is more properly called, appears to be due to a species of Fusarium, which enters the plants through their roots.

A systematic study of the fungus has been begun, and attempts are being made to find a remedy for it. This has led to a study of resistance, and marked differences have been noted for different varieties of tomatoes. One strain, characterized as No. 7, is said to be remarkably resistant and to possess a fruit of desirable quality.

Diseases of citrus fruits, P. H. Rolfs, H. S. Fawcett, and B. F. Floyd (*Florida Sta. Bul. 108, pp. 25–47, figs. 14*).—Attention is called to the principal diseases to which citrus fruits are subject in Florida. Many of the troubles described affect other parts of the plants than the fruit, and the notes presented were mostly obtained incidental to other studies.

Among the troubles described are the russeting due to mites, melanose, russeting and tear-streaking caused by the withertip fungus, buckskin, silver-scurf, sun scald, die-back markings, anthracnose, chemical injuries due to too large applications of fertilizers and sprays, various forms of mechanical injuries, blue mold rot, stem end rot, Diplodia rot, and black rot. Some of these diseases have been reported upon in other publications of the station. Where preventive measures are definitely known the authors describe them.

Blemishes of citrus fruits, J. E. Coit (*Proc. Fruit Growers' Conv. Cal., 39 (1911), pp. 22–25*).—Some 48 blemishes of citrus fruits are outlined which operate to reduce the profits from the citrus industry. These are divided into 4 classes, viz, insect, fungus, mechanical, and physiological blemishes, and are discussed very briefly as to their prevention, most attention being given to the brown spot of the navel orange.

A Loranthus affecting citrus trees (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 12, p. 679*).—The presence of *L. secundiflorum* on citrus fruit trees, particularly *Citrus decumana*, is reported.

The method of infection of grape leaves by Plasmopara viticola, L. RAVAZ and G. VERGE (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 26, pp. 1502–1504; Prog. Agr. et Vit. (Ed. l'Est-Centre), 33 (1912), Nos. 1, pp. 6–10, figs. 4; 4, pp. 99, 100*).—The authors hold as a result of a study of the biology of *P. viticola*, the cause of the downy mildew of grapes, that the principal infection comes from spores that find lodgment on the upper surface of the leaves. The zoospores have been found very motile, and in the case of heavy or prolonged rain they would doubtless find their way to the lower sides of the leaves. The authors claim that if the upper surfaces of the leaves are well covered with fungicides the zoospores will be destroyed and little infection follow.

Recent investigations on the development and treatment of downy mildew of grapes, H. FAES (*Rev. Vit., 36 (1911), Nos. 933, pp. 489–493; 934, pp. 517–524, figs. 4; 935, pp. 545–550*).—A report is given of observations on the development of the grape downy mildew (*Plasmopara viticola*) and means for its control.

The author, as a result of his investigations, maintains that infection is almost exclusively through the stomata which are located on the under side of the leaf. Spores of the mildew were placed on both faces of many leaves representing the leading varieties of grapes, and in almost every instance no infection followed where they were placed upon the upper side of uninjured leaves, while a considerable proportion of infections followed their application to the under surface of the leaves, or to the upper surface when the leaves had been injured by hail.

The author claims that his experiments show the necessity of modifying the usual method of spraying grapes for the control of downy mildew, and that the fungicide should be directed upon the under sides of the leaves.

The development of the disease on the fruits remains to be investigated.

The simultaneous occurrence of downy mildew on June 30, 1911, in several distant localities, J. CAPUS and M. BAILLY (*Rev. Vit., 36 (1911), No. 920, pp. 129–133*).—The authors have investigated the occurrence of the downy mildew of grapes in its relation to atmospheric and other conditions in Burgundy, Poitou, and about Bordeaux. In the 3 regions the meteorological conditions between June 8 and 14 were essentially the same, and the downy mildew made its appearance about June 30 in all 3 regions, indicating that the infection is closely associated with atmospheric conditions of a general character.

A study of roncet of the grape, R. AVERNA-SACCÀ (*Atti R. Ist. Incoragg. Napoli, 6. ser., 62 (1910), pp. 113–143*).—The author reports upon a study of roncet or court noué of grapes, one of the striking characteristics of which is the greatly shortened internodes. In addition the stems are weak and often fasciated. The leaves are commonly less developed, sometimes chlorotic, dried along the margins, and the tips extended and often blackened. The fruit, if any is produced, is abortive and deformed.

A review is given of various theories that have been advanced as to the cause of this disease. From his investigations the author is led to consider it a functional disorder, characterized by a partial degeneration of the parenchymatous tissues of the plant followed by the production of a mucilaginous substance which is noninfectious when applied to sound plants. There appears to be a connection between this disease and sudden changes in temperature during the early spring.

The disease may be distinguished from anthracnose and mal nero, both of which it somewhat resembles in gross appearance, by the absence of the pustules formed by the fungus *Glœosporium ampelophagum*, the cause of anthracnose, and by the infectious character of the gum in mal nero.

Diseases of the prickly pear, H. TRYON (*Queensland Agr. Jour., 27 (1911), No. 2, pp. 76–80*).—A list is presented of different fungi that have been reported upon prickly pears (*Opuntia* spp.), and suggestions are given regarding the possibility of some of them being utilized in destroying prickly pears in Australia.

The chestnut bark disease, F. W. RANE (*Boston: State Forester, 1912, pp. 10, pls. 4, map 1*).—An account is given of the history and distribution in Massachusetts of the chestnut bark disease, due to *Diaporthe parasitica*. The author states that the disease is almost universally distributed through the State, infection in the western half being quite general. On account of the severe infection and the small proportion of chestnut timber that could be saved, he thinks the State would not be justified in making any attempt to eradicate the disease.

The fate of the chestnut tree, H. HITIER (*Rev. Hort. [Paris], 84 (1912), No. 1, pp. 17, 18*).—Attention is called to the severe losses in France and elsewhere due to the black canker of chestnut trees, the author stating that fully 10,000 hectares of plantations of this species have been devastated.

He points out that Mangin attributes the disease to the presence of a parasite, *Myccelophagus castaneæ*. This destroys the mycorrhiza and young roots of the trees, diminishing the absorbing surface of the plants.

It has been suggested that grafting chestnuts upon oaks might give favorable results, as well as the use for stock of the Japanese chestnut, which so far has proved resistant.

Notes on the oak Oïdium in France, G. ARNAUD and E. FOËX (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 3, pp. 124–127*).—According to the authors, perithecia of the fungus which occurs so abundantly in the oïdium stage on the oak in France and other parts of Europe were found on the leaves of *Quercus sessiliflora* in December, 1911. The presence of these fruiting organs made it possible to determine definitely the relationship of the conidial with the perfect stage.

Studies of material and comparisons with specimens received from America, where the fungus has long been known, led the authors to decide that it belongs to *Microsphæra quercina*. *M. alni* of some authors is held to be a synonym of the first mentioned species, the name of which is preferred.

Notes are given on the distribution of the fungus in France and some of its most prominent characters. It is stated that while the Oïdium on the oak has long been known, it is only recently that the perithecia have been recognized.

Expert opinion on dry rot, C. WEHMER (*Jahresber. Ver. Angew. Bot., 8 (1910), pp. 178–198*).—This is an account of the examination, microscopical and cultural, of certain woods and other structural materials from buildings alleged to be attacked by dry rot, with the opinions of botanists on the cases.

Three fungi were identified, viz, *Merulius lacrymans* (true dry rot), *Coniophora cerebella*, and *Polyporus vaporarius*, of which characteristic appearances are briefly given. Other species may have been present in one instance. Cultures were not very successful. Recommendations are made as to prevention of attacks and treatment of infected woods.

A disease of sweet peas, asters, and other plants, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1912, No. 1, pp. 44–52, pl. 1*).—The author describes a disease attacking asters, sweet peas, and various other cultivated plants, especially during their seedling stages, by a stage of the fungus *Thielavia basicola*. The form of the fungus described is that called *Milowia nivea*, from its abundant white mold-like growth.

The symptoms of disease in different plants are described, and the treatment of seed beds by sterilizing with formaldehyde or by heating is advised. Where

this is not possible, it is thought that the use of coal ashes, volcanic scoria, or other similar material for the formation of seed beds would probably prove advantageous.

On the biology of the anther smut of Melandrium album, E. WERTH (*Arb. K. Biol. Anst. Land u. Forstw., 8 (1911), No. 3, pp. 427–450, figs. 4*).—A report in continuation of those previously made is here given on the author's investigations with *Ustilago antherarum*, in which the conclusions, mainly confirmatory of those previously announced (E. S. R., 23, p. 654), are in brief as follows:

This smut may infect flowers of either sex, causing more or less change of form, and in some cases producing a resemblance to hermaphroditism with loss of function. Seed from an infected plant produce healthy flowers, due probably to the fact observed that the infection does not make its way directly into the cells of the host so long as these are fresh and plump, but only after death and decay of some of the cells have given the fungus a foothold saprophytically. Infection advances apparently by repeated production of conidia. In a few cases young leaf shoots were infected with spores directly, and in one case this infection spread gradually to neighboring parts. Infection of young plants occurred but very sparingly, possibly from spores in the soil. It appears that visits of insects play an important rôle in the spread of infection in wild plants which, so far as examined, confirm these conclusions.

Parasitic bacteria on leaves of Elodea, E. MERKER (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 23–25, pp. 578–590, pl. 1, figs. 11*).—The author investigated certain injuries found on leaf edges of *E. canadensis*, *E. crispa*, and *E. densa*, most noticeable in autumn, which appeared to be the work of microorganisms.

Two bacteria were isolated which were thought to cause the injury. These appeared to be new species, and to them the names *Micrococcus cytophagus* and *M. melanocyclus* were given. Technical descriptions of both are submitted in the article.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Economics of ornithology in South Africa, A. ROBERTS (*Agr. Jour. Union So. Africa, 1 (1911), No. 3, pp. 352–369; abs. in Auk, 29 (1912), No. 1, pp. 121–123*).—The species of economic importance are briefly considered in their relations to the grain, fruit, poultry, and stock-raising industries, and as scavengers. In view of the backward state of the knowledge of the real economic value of the birds of South Africa, the South African Ornithologists' Union advises the establishment of a government department to deal solely with this subject.

Conifers damaged by squirrels, A. W. HILL (*New Phytol., 10 (1911), No. 9–10, pp. 340–342, pl. 1*).—The nature of the injury caused by squirrels to *Thuya plicata* and *Cupressus lawsoniana* in Cornwall, England, is discussed.

Nomenclature of economic insects, H. M. LEFROY (*Jour. Econ. Biol., 6 (1911), No. 3, pp. 97–102*).—A paper read before the Association of Economic Biologists, at Birmingham, in July, 1911.

Our insect friends and foes, F. M. DUNCAN (*London, 1911, pp. XI+296, pls. 16*).—A popular work in which are taken up the study of insect life, insect communities, aquatic insects, insects in commerce, insects and flowers, beneficial beetles, and insect pests of various sorts.

The principal insects injurious to agriculture during 1908–9, M. H. SWENK (*Ann. Rpt. Nebr. Bd. Agr. 1910, pp. 362–369*).—Brief accounts are given of the occurrence of the more important insect pests of the year under report.

Insect pests (*Rpt. Local Dept. Agr. Barbados, 1910–11, pp. 42–45*).—In experiments with remedial measures for the root borer *Daiprepes abbreviatus*

which was again in evidence during the year, cyanid of potassium, carbon bisulphid, and fusel oil were found to be the most effective. The author states that he has never seen a clump of sugar canes attacked by the root borer that had not been previously attacked by the root fungus (*Marasmius sacchari*).

Several cotton pests, scale insects on mangoes, cherry, citrus, guava, etc., are briefly noted. Two apparently new species of mites were found, one keeping in check the purple scale on citrus and the other parasitizing the star scale (*Vinsonia stellifera*) on *Eugenia jambos*. The author records the occurrence of (1) a species of Tetrastichus, bred from the star scale; (2) an undetermined hymenopterous parasite of *Protopulvinaria pyriformis;* and (3) a fungus which was found at times attacking *Dactylopius calceolariæ*. A fungus found parasitizing *Lecanium viride* and *P. pyriformis* was determined by H. S. Fawcett of the Florida Station as *Cephalosporium lecanii*.

Injurious insects and other animals observed in Ireland during the year 1910, G. H. CARPENTER (*Econ. Proc. Roy. Dublin Soc., 2 (1911), No. 3–4, pp. 31–51, pls. 5, figs. 6*).—The author reports briefly upon the occurrence of insect enemies of corn, cabbage, turnips, mangels, and potatoes, and of the orchard, forest, garden, and storehouse.

Report of the government entomologist, E. E. GREEN (*Admin. Rpts. Roy. Bot. Gard. Ceylon, 1910–11, Ed., Sci., and Art., pt. 4, pp. c5–c8*).—This report includes brief notes on the insects attacking tea, rubber, cacao, cotton, tobacco, and Albizzia, and miscellaneous pests.

A bacterial epizootic among locusts in Mexico, F. H. D'HÉRELLE (*Jour. Agr. Trop., 11 (1911), No. 122, pp. 238–240; abs. in Agr. News [Barbados], 10 (1911), No. 252, p. 410*).—Previously noted from another source (E. S. R., 26, p. 246).

Some new California and Georgia Thysanoptera, P. R. JONES (*U. S. Dept. Agr., Bur. Ent. Bul. 23, pt. 1, tech. ser., pp. VI+24, pls. 7*).—In this paper the author describes 13 new species of thrips, representing 9 genera, that were collected during the course of investigations of the pear and orange thrips. Tables for their separation are included.

Tetrastichus gentilei and its relation to the olive Phlœothrips, G. DEL GUERCIO (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 8 (1911), No. 3–4, pp. 222–227*).—This is a preliminary paper dealing with an endophagus parasite of the olive thrips (*Phlœothrips oleæ*), which the author places in the genus Tetrastichus under the specific name *gentilei*.

The eggs are deposited in the young larvæ of the thrips, the winter being passed in the larval stage in the host and the transformation completed in the spring. The parasites are very abundant in Liguria, as high as 90 per cent of the hosts having been observed to be parasitized. In Lucca, however, the parasite could not be readily found. The author suggests the cutting of branches from trees bearing parasitized material and shipping them to infested points for distribution.

On a new species of Phlœothripidæ of Japan, H. OKAMOTO (*Trans. Sapporo Nat. Hist. Soc., 3 (1909–10), pp. 89–91*).—Under the name *Liothrips glycinicola* the author describes a new species of thrips which appears to damage the pollen grains of certain leguminous plants, such as daizu (*Glycine hispida*), azuki (*Adzukia subtrilobata*), sasage (*Vigna sinensis*), etc.

The red or orange scale (Chrysomphalus aurantii), H. J. QUAYLE (*California Sta. Bul. 222, pp. 99–150, figs. 37*).—This bulletin deals with the subject under the following headings: History, distribution, economic importance, food plants, descriptions of the stages, life history and habits, seasonal history, locomotion and spread, parasites, predatory enemies, the yellow scale (*C. aurantii citrinus*), and the systematic position of *C. aurantii*.

The red scale, originally described from New Zealand in 1878, was first observed in this country in 1880, in which year it was found infesting orange trees at San Gabriel and Los Angeles. While recorded from many other food plants than citrus trees, in California it is limited as a pest entirely to the citrus, so that its distribution is governed largely by this host plant.

The red scale is deemed the second most important insect enemy of citrus trees in California and the total amount of control work directed against it and the yellow scale, which is a variety of the red, nearly, if not quite, equals that against the black scale. "No citrus scale in California so quickly and so permanently injures the tree as the red scale. . . . Practically the entire tree may be killed . . . sometimes in one or two years' infestation. It infests all parts of the tree, leaves, branches, fruit. It not only causes a dropping of the leaves, but actually kills large branches. Aside from this permanent and serious injury to the tree, the presence of the scale on the fruit renders it unmarketable. Trees that do not have a severe infestation of the scale, and where the tree itself is not seriously injured, may have fruit badly infested by the scale."

As regards the life history, "The average length of the life cycle from the active young to the appearance of young again is about 3 months. During the warmer weather it will run slightly under this, and during the coldest weather it will run considerably more, the extremes being from 72 days to nearly 150 days. Four generations a year will be the largest number in a season. It is not unlikely that this number occurs in the warmer sections—as Redlands and Riverside. But in most sections 3 generations, with a partial fourth, will represent the actual conditions. Starting with April 1, the beginning of the next generation will be about July 1. Those young appearing at this time will be producing young themselves by the first of October. This will make 2 generations during the months of greatest activity. Those young appearing in October may not, as our life history work has shown, give rise to young again before February or March. This makes 3 full generations, with a partial fourth, for conditions as they obtain at Whittier."

An account by the author relating to the locomotion and spread of this and other scale insects has been previously noted (E. S. R., 26, p. 149).

Aphelinus diaspidis is its most common parasite at the present time. Examinations and counts made at various times during the past 3 years have failed to show that its parasitism exceeds 10 per cent. Descriptions of its stages and a brief account of its life history and habits are presented. Other parasites noted are *Prospaltella aurantii*, *Coccophagus lunulatus*, *Signiphora occidentalis*, *Aphycus immaculatus*, and *Alaptus criococci*. *Rhizobius lopanthæ* and the steel-blue ladybird beetle (*Orchus chalybeus*) are mentioned as predatory enemies.

The yellow variety of this scale (*C. aurantii citrinus*) is widely distributed over the citrus belt of southern California and often associated more or less with *aurantii*. In addition to its occurrence in the southern part of the State, it is also found on the citrus trees of the Sacramento Valley. *Aspidiotiphagus citrinus*, formerly known in California as the golden chalcid, which has been met with largely in connection with the yellow scale, is said to be most abundant in Santa Barbara County.

A bibliography of the literature issued since the publication of Mrs. Fernald's catalogue of the Coccidæ in 1903 (E. S. R., 15, p. 278), furnished by E. R. Sasscer of the Bureau of Entomology of this Department, is appended.

The black scale (Saissetia oleæ), H. J. Quayle and E. W. Rust (*California Sta. Bul. 223, pp. 151–200, pls. 8, figs. 24*).—This scale, which was described in 1782 from specimens taken on the olive, was first recorded from this country in

1880 at which time it was found to be well established in various parts of California. In America it has also been recorded from Brazil, the West Indies, Mexico, Massachusetts, South Carolina, Ohio, and Florida. In California it occurs to a greater or less extent in practically all of the counties, but is limited as a pest to the citrus belt of southern California, the different deciduous trees in the coast counties about San Francisco Bay, and to some extent on olive trees of the interior valleys. "In the citrus area of southern California, the black scale is the most widely distributed of all the scale pests. It occurs in all of the counties from Santa Barbara to San Diego. It is less abundant in the interior counties of Riverside and San Bernardino; but even here in some sections it becomes an important pest. But the black scale becomes most abundant nearer the coast, since it is a scale that is more adapted to the cooler and moister climate of such sections."

The important injury to citrus fruits is due to the sooty mold fungus (*Meliola camelliæ*), which develops in the honeydew which the scale excretes. In California the scale ranks first as a pest on citrus trees. "On the olive, pepper, and oleander, it also occurs in abundance, and often does much injury, but it is only rarely that control work is undertaken on these trees. Of the deciduous trees the apricot and prune are the worst attacked. On these trees *Lecanium corni* is often associated with the black, and is the more important pest of the two in the deciduous fruit sections. But the black scale often does reach the status of a pest on these trees and spraying is done to control it. It is not uncommon to see apricot trees completely covered with sooty mold fungus as a result of black scale infestation."

Technical descriptions are given of the stages in connection with a detailed report of studies of the life history and habits of this scale, which are taken up under the following headings: The egg; the active larva, including experiments on the rate of travel over sand and orchard soil, a report of which has been previously noted (E. S. R., 26, p. 149); the fixed young; the adult female; the development of the male; and seasonal history.

"There is usually but one complete generation of the black scale in a season. The great majority of these come to maturity in the spring months, so that most of the eggs are deposited by midsummer. The time of maturing of the bulk of the black scales will vary somewhat from year to year, and in some years there will be a much more uniform hatch than others. Taking a specific season, as 1910 in the Los Angeles district, the height of egg-laying was during the third week in May. The greatest production of young was about the third week in June. Eggs will be deposited by a single scale during a period of 2 months. By the middle of July, therefore, most of the young had already appeared." In summarizing the length of the life cycle of the male during the summer months, it was found to be as follows: First stage 1½ months; second stage, 1 month; propupa, 8 days; pupa, 10 days; adult, 3 days; total 96 days, or about 3 months.

A somewhat detailed account is given of the life history, habits, etc., of *Scutellista cyanea*, the most important insect enemy of the black scale in California. This parasite was first successfully introduced into this country from Italy in 1900 and has since become well established in California in most of the sections where the scale occurs in injurious numbers. The percentage of scales parasitized often runs as high as 75 per cent, but this varies greatly in different sections and in the same section in different years. A brief account is also given of the hyperparasite *Cerchysius* sp., which is occasionally found under the old black scales instead of the Scutellista pupa at the expense of which it develops, of *Tomocera californica*, which parasitizes the eggs of the black scale, and of

Aphycus flavus a parasite of the male black scale in the second stage. *Rhizobius ventralis*, *Orcus chalybeus*, and several other coccinellids are mentioned as predaceous enemies of the black scale. Other species of unarmored scales mentioned as associated with the black scale are the hemispherical scale (*S. hemisphærica*), the soft brown scale (*Coccus hesperidum*), the European fruit lecanium (*Lecanium corni*), the frosted scale (*L. pruinosum*), etc.

A bibliography of 53 titles, furnished by E. R. Soccer, is appended, covering references since 1903.

Parasitism of the black scale (*Agr. News* [*Barbados*], *10* (*1911*), *No. 239*, *p. 202*).—An account is given of the parasite *Zalophothrix mirum*, which attacks mature black scales that are about to begin or have already begun egg laying.

But very rarely is more than one larva found in a single black scale, although in a few instances 2 have been observed. "In a recent examination of a large number of black scales on cotton in one field in Antigua, it was found that nearly every scale insect which had reached the egg-laying stage harbored a grub of this parasite. There were very few punctured scales to be seen, and it is very difficult to obtain specimens of the adult parasite by means of the insect net."

On the locomotion and length of life of the young of Pulvinaria vitis ribesiæ, W. E. Collinge (*Jour. Econ. Biol.*, *6* (*1911*), *No. 4*, *pp. 139–142*).—The data here presented have been previously noted (E. S. R., 26, p. 452).

Bird enemies of the Chinese cotton scale, W. W. Arnold (*Auk*, *29* (*1912*), *No. 1*, *p. 113*).—Redpolls (*Acanthis linaria*) were observed by the author during the winter of 1910–11 to feed daily on the Chinese cotton scale on maples at Colorado Springs, Colo. Frequently a number of pine finches would associate with the redpolls and feed upon this pest, which is said to have threatened the destruction of shade trees, especially maples and black locusts, as well as ornamental shrubs and vines, at Colorado Springs.

Preliminary note on the silk glands of Bombyx mori, Y. Tanaka (*Trans. Sapporo Nat. Hist. Soc.*, *3* (*1909–10*), *pp. 19–26*).—This paper is preliminary to the account noted below.

Studies on the anatomy and physiology of the silk-producing insects, Y. Tanaka (*Jour. Col. Agr. Tohoku Imp. Univ.*, *4* (*1911*), *No. 2*, *pp. 28*, *pls. 7*).—This paper deals with the structure of the silk glands and the silk formation in *Bombyx mori*. A bibliographical list of 19 titles is appended.

The leopard moth (Zeuzera pyrina), W. E. Britton and G. A. Cromie (*Connecticut State Sta. Bul. 169*, *pp. 3–24*, *pls. 8*, *figs. 6*).—This bulletin discusses the appearance of infested trees, the occurrence of the moth in Europe and other countries, the history of its spread in America, distribution and spread in Connecticut, descriptions of its stages, its life history and injury, natural enemies and checks, and remedial treatment.

"The pest has been especially destructive to elm and silver maple trees in the coast cities and towns of Connecticut, but is not so abundant in the open country. It has caused much damage also in the cities of New Jersey, New York City, Providence, Cambridge, and Boston. . . .

"The moths appear about July 1, the males being very common around electric lights, and the females lay eggs singly or in groups of 2, 3 or 4, in the crevices of the bark or near the buds. The larvæ, hatching in a few days, begin to tunnel in the twigs, and by the end of the season are about 1 inch in length. They leave the small branches and crawl over the bark to enter larger ones, cutting large galleries in them and expelling the frass through round holes, which they soon close with silk webs. During October the borers

go deeper into the wood, and remain through the winter 2 inches or more beneath the bark. They pupate in their burrows the second spring, and before the moth emerges the pupa works itself partly out of the opening, and the adult flies away, leaving the empty case protruding from the burrow.

"There are few natural checks, only one parasite being known in this country and four in Europe. It is believed, however, that certain birds, especially woodpeckers, prevent the spread of the leopard moth in the open country. Many larvæ are doubtless killed by the breaking off of the branches, which in cities are carted away and destroyed.

"Removing infested branches, injecting carbon disulphid (bisulphid) into the burrows, and stopping the opening, and probing with a hooked wire for the larva are some of the methods of control.

"Planting species of trees not badly infested, like oaks, honey locust and sycamore, and especially those kinds that do not grow very large and have a smooth bark; placing trees farther apart, so that the larvæ can not easily crawl from one to the other; and keeping the trees well nourished and vigorous, are the chief preventive measures."

A bibliography of 84 titles is appended. See also a previous note (E. S. R., 21, p. 458).

A parasite of the eggs of the cochylis and eudemis moths, P. Marchal and J. Feytaud (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 14, pp. 633–636, fig. 1*).—An egg parasite of the cochylis and eudemis moths found during August and September in the Departments of Saône-et-Loire, Gironde, and Dordogne has been identified as *Oophthora semblidis*. This species has been recorded by Vassiliew,[a] under the name *Pentarthron carpocapsæ*, as developing in the eggs of various moths, including *Malacosoma neustria*, *Euproctis chrysorrhœa*, and *Dendrolimus pini*, and by Schreiner[a] under the same name as parasitizing 65 per cent of the eggs of *Carpocapsa pomonella*, in orchards in Astrakhan, Russia. It has also been recorded as parasitizing the eggs of *Mamestra brassicæ*, of the neuropteron *Semblis lutria*, and of the tenthredinid *Lyda stellata*.

The plum leaf-miner (Nepticula slingerlandella), C. R. Crosby (*New York Cornell Sta. Bul. 308, pp. 219–227, figs. 14*).—This is a report of studies commenced by the late M. V. Slingerland in October, 1907, and continued by the author.

The plum leaf-miner is an enemy of the plum that first came to attention in an orchard at Rochester in 1907, at which time the infestation was reported to have been increasing for a number of years. A brief account of the occurrence of the pest by Slingerland has previously been noted (E. S. R., 22, p. 654).

On hatching from the egg the larva penetrates the tissue of the leaf and first eats a narrow linear mine an inch or less in length, then widens the mine so as to produce an irregular, more or less ovate blotch about ½ in. long. The part of the leaf so injured turns brownish and dies. From 3 to 12 mines are often found in a single leaf. The trees become partially defoliated and the fruit may fall prematurely. When continued for a series of years this injury tends to weaken the vitality of the tree and to injure the size and quality of the crop. The pest has shown a decided preference for certain varieties: German and Italian prunes are most severely infested; French and Shropshire Damsons are less subject to attack, although some years ago the former variety was badly infested; Diamond, Bradshaw, Lombard, and Rheinclaude are nearly immune.

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[a] Ztschr. Wiss. Insektenbiol., 3 (1907), Nos. 7, p. 219; 12, p. 386.

The moths emerge from the cocoons at or near the surface of the ground during the daytime in the latter part of May and in early June. During the day they remain quietly on the bark of the trunk and larger branches, none being found on the leaves. Several hundred moths are often found on a single tree; when disturbed they suddenly take flight and most of them settle on the opposite side of the tree. They gradually decrease in numbers and about the middle of June they disappear.

The act of egg-laying has not been observed, but is thought to take place in the evening or at night, as the moths are rarely seen on the leaves during the day. The eggs are attached to the undersurface of the leaves, usually at the forks of the more prominent veins. "The exact time required for the hatching of the eggs has not been determined, but it can not be far from 2 weeks. On June 2, 1908, an examination of the orchard showed that a great number of eggs had been laid; on June 9 no eggs had hatched, and on June 18 hatching had just nicely begun.

"In hatching, the larva eats its way out of the eggshell on the underside next to the leaf, and enters the leaf directly without coming out on the surface. This is a point of great practical importance, as showing the futility of attempting to kill the larvæ with an arsenical spray. When full grown the larva is about $\frac{1}{8}$ in. in length, greenish white in color with the head light brown. . . . When full grown the larva leaves the mine through a cut in the upper surface of the leaf, falls to the ground, and there constructs a small flattened brownish cocoon in cracks in the soil, under loose stones, or between the base of the tree and the surrounding soil. Where the ground is undisturbed, the cocoons are rarely found more than an inch below the surface. Sod furnishes ideal winter quarters for the cocoons. . . . After forming the cocoon the larva apparently does not transform at once; a cocoon opened August 4, 1908, contained a larva. The winter, however, is passed in the pupal stage. On October 10, 1911, the writer opened a number of freshly gathered cocoons and found that all the larvæ had transformed to pupæ."

A chalcidid parasite (*Derostenus salutaris*) has increased in abundance to such an extent that in the fall of 1911 nearly one-half of the cocoons examined were infested. The genus Nepticula to which this leaf-miner belongs contains over 40 species from the United States and over 70 species are known to occur in the British Isles. The larvæ of all species of this genus so far as known are leaf-miners, feeding within the leaf just below the upper epidermis. As a rule each species is confined to a particular food plant, or at most to 2 or 3 closely related food plants.

A list of the American species of Nepticula, together with their food plants is given, as is a brief account of the European plum leaf-miner (*Nepticula plagicolella*), a closely related form.

"The plum leaf-miner has proved to be a difficult insect to control, owing to the fact that from the time the larva leaves the egg it feeds entirely within the leaf out of reach of any poison spray. Measures directed against the moths, eggs, and larvæ have all proved failures, and only partial success has been attained by thorough cultivation to destroy the larvæ and pupæ in their cocoons."

The structure of certain dipterous larvæ with particular reference to those in human foods, N. BANKS (*U. S. Dept. Agr., Bur. Ent. Bul. 22, tech. ser., pp. 44, pls. 8, fig. 1*).—The author here presents the results of a study made of the structure of certain dipterous larvæ that may be suspected or concerned in internal myiasis. The bulletin first discusses the occurrence of and manner in which dipterous larvæ may be ingested, the life history of these flies, their classification, and general characters, with a synopsis of the groups concerned.

Attention is called to the fact that the larvæ of a considerable number of flies either regularly or occasionally live in substances used by man as food, and that the great majority pass through the intestinal tract without his knowledge, as most cause little or no trouble.

"The dipterous larvæ that may be swallowed by man belong to several families included in the old group of Muscidæ. These families are the true Muscidæ, Sarcophagidæ, Anthomyiidæ, and Trypetidæ. Other groups, as Drosophilidæ, Sepsidæ, and Ortalidæ, are of much rarer occurrence. The flies of the Ortalidæ, Trypetidæ, and Sepsidæ are quite different from those of the other groups, but the adults of the 3 other families are very similar in structure, and the limits of the groups or the number of groups is not constant with different specialists in Diptera."

The work concludes with a brief discussion on the classification of these Diptera and a bibliography of 23 titles.

The cheromyias, new Diptera with larvæ which suck the blood of mammals, E. Roubaud (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 11, pp. 553–555*).—Two new flies from the Soudan, the larvæ of which suck the blood of thin-haired mammals, particularly porcines of the genera Phacochœrus and Orycteropus, are described as *Chœromyia boueti* and *C. chœrophaga*. The new genus Chœromyia with Auchmeromyia, which is represented by the Congo floor maggot (*A. luteola*), forms a special tribe of the Muscidæ.

Systematic studies of the hematophagous Muscidæ of the genus Lyperosia, M. Bezzi (*Arch. Par., 15 (1911), No. 1, pp. 110–143, pl. 1, figs. 15*).—Ten species of this genus are dealt with. The paper concludes with a synonymic catalogue of the species of stomoxydines described to the end of 1910. A bibliography of 59 titles is appended.

Mosquito sucked by a midge, F. H. Gravely (*Rec. Indian Mus., 6 (1911), No. 1, p. 45*).—The author records having observed a small chironomid fly, apparently belonging to the genus Culicoides, with its proboscis inserted and apparently engaged in sucking blood from the abdomen of a mosquito (*Myzomyia rossii*).

Some experiments on larvicides, R. Ross and E. S. Edie (*Ann. Trop. Med. and Par., 5 (1911), No. 3, pp. 385–390*).—The results of experiments with a number of larvicides, in each of which about 50 larvæ of *Culex pipiens* were used, are reported.

A larvicide prepared by dissolving resin in crude carbolic acid, and treating the solution with caustic soda gave the following results: "One part larvicide in 500 parts of water killed 80 per cent of the larvæ (*C. pipiens*) in 2 hours, and the remainder in 3½ hours. One part larvicide in 1,000 parts of water killed 70 per cent of the larvæ in 4 hours, and most of the remainder by next morning (18 hours). One larva, however, lived in this solution for 22 hours. One part larvicide in 2,000 parts of water killed about 30 per cent of the larvæ in 6 hours, but the rest of the larvæ were killed very gradually, some surviving for about 50 hours."

In an experiment with an emulsion called "Sanitas-Okol" which appears to contain a large proportion of phenols and allied compounds, and when much diluted mixes well with water, a dilution of 1 in 5,000 killed 50 per cent of the larvæ in 1¾ hours, and all but 3 in 3½ hours, the last 3 being dead in about 5 hours. One part Sanitas-Okol in 10,000 parts of water killed all the larvæ except 2 in 6 hours, the last 2 dying in the course of the night.

One part cyanid in 240,000 parts of water killed all the larvæ in the course of a night or in less than 16 hours from the time the cyanid was added. One part cyanid in 303,000 parts of water killed about 50 per cent of the larvæ in

6½ hours, and all except one larva in 22 hours. Strychnin in dilutions greater than 1 in 50,000 parts of water appeared to have no effect on larvæ.

In experiments with the larvæ of *Anopheles bifurcatus*, it was found that one part Sanitas-Okol to 5,000 parts of water killed 18 larvæ out of 20 in 2¼ hours, the other 2 living for 3¼ hours. One part Sanitas-Okol in 10,000 parts of water killed 23 larvæ out of 26 in 5½ hours and the rest in about 8½ hours. Among the agents experimented with that gave poor results are mercuric chlorid, copper sulphate, oxalic acid, and saponin.

A catalogue of the Coleoptera (*Coleopterorum Catalogus. Berlin, 1911, pts. 28, pp. 355–585; 29, pp. 87–190; 30, pp. 32; 31, pp. 8; 32, pp. 61; 33, pp. 96; 34, pp. 106; 35, pp. 94; 36, pp. 102*).—In continuation of this work (E. S. R., 25, p. 158) part 28, by H. Gebien, takes up the Tenebrionidæ, III; part 29, by M. Bernhauer and K. Schubert, the Staphylinidæ, II; parts 30 and 31, by K. W. von Dalla Torre, the Cioidæ and the Aglycyderidæ and Proterrhinidæ, respectively; part 32, by E. Csiki, the Hydroscaphidæ and Ptiliidæ; part 33, by K. W. von Dalla Torre, the Nosodendridæ, Byrrhidæ, and Dermestidæ; part 34, the family Erotylidæ, by P. Kuhnt, and the Helotidæ, by C. Ritsema; part 35, by J. Weise, the Chrysomelidæ: Hispinæ; and part 36, by M. Pic, the Anthicidæ.

Two apple tree borers, H. F. Wilson (*Oregon Sta. Circ. 15, pp. 4*).—This circular consists of brief accounts of the flat-headed and round-headed apple tree borers, with remedial measures.

The dying hickory trees: Cause and remedy, A. D. Hopkins (*U. S. Dept. Agr., Bur. Ent. Circ. 144, pp. 5, figs. 4*).—Examinations made of hickory trees, a large percentage of which have died in various sections throughout the northern tier of States from Wisconsin to Vermont and southward through the Atlantic States to central Georgia and to a greater or less extent within the entire range of natural growth of the various species, have revealed the fact that the hickory bark beetle (*Scolytus quadrispinosus*) is by far the most important insect enemy concerned in their destruction. This circular gives information by means of which the work of the pest may be recognized, and its habits and remedial treatment are briefly considered.

Remedial measures in general consist in locating and disposing of the hickory trees within an area of several square miles, that have died during the previous summer and fall, together with those of which part or all of the tops or large branches have died. In order to destroy the broods of the beetle before they begin to emerge, the work must be completed before the first to the middle of May.

The occurrence of Necrobia and Dermestes in cotton bales, J. Mangan (*Jour. Econ. Biol., 6 (1911), No. 4, pp. 133–138, figs. 4*).—The author records an infestation of bales of cotton to a depth of several inches by the larvæ and adults of *Necrobia rufipes*, *Dermestes vulpinus*, and *D. frischi*. The infestation, which took place while the cotton was in transportation in holds of ships, was due to a migration from hides, dried bones, etc. being carried by the vessel.

The tobacco beetle and a method for its control (Lasioderma sp.), D. B. Mackie (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 11, pp. 606–612, pl. 1, fig. 1*).—This is an account of a cigarette beetle which has recently become a very serious menace to the export tobacco trade in the Philippines, and of the means by which it can be controlled.

The bark beetles of northern and central Japan, Y. Niisima (*Trans. Sapporo Nat. Hist. Soc., 3 (1909–10), pp. 1–18*).—The Scolytidæ of Sachalin, Hokkaido, and Honshu are dealt with. See also a previous note (E. S. R., 22, p. 557).

Insect damage to standing timber in the national parks, A. D. Hopkins (*U. S. Dept. Agr., Bur. Ent. Circ. 143, pp. 10*).—This paper, which was read at a conference of national park superintendents, September 11–12, 1911, deals with

the character and extent of the insect damage; the principal depredators, namely, the mountain pine beetle, western pine beetle, Jeffrey pine beetle, Douglas fir beetle, red turpentine beetle, Engelmann spruce beetle, and Black Hills beetle; favorable and unfavorable conditions for the beetles; and general methods of control.

Dysentery in bees and Nosema apis, F. R. Beuhne (*Jour. Dept. Agr. Victoria, 9 (1911), No. 8, pp. 550, 551*).—The author states that microscopical examinations of bees from all parts of Victoria have shown that *N. apis* is present in some bees in nearly every apiary, even in localities where losses have never occurred and where colonies are in a prosperous and highly productive condition.

Recent publications on the occurrence of, and experiments with, *N. apis* in bees in Germany, by W. Hein and A. Maassen, are briefly reviewed.

On the biology of Phryganea grandis, C. Wesenberg-Lund (*Internat. Rev. Gesam. Hydrobiol. u. Hydrog., 4 (1911), No. 1–2, pp. 65–90, pls. 2; abs. in Jour. Roy. Micros. Soc., 1911, No. 6, pp. 750, 751*).—An account of studies of the life history and habits of the caddis-fly, *P. grandis*.

Avian cestodes, P. Solowiow (*Centbl. Bakt. [etc.], 1. Abt., Orig., 60 (1911), No. 1–2, pp. 93–132, figs. 26; abs. in Jour. Roy. Micros. Soc., 1911, No. 6, p. 760*).—The author deals with *Monopylidium infundibulum* from a fowl to which he had fed from 15 to 20 house flies (*Musca domestica*) daily, thus corroborating Grassi's view that the fly is the intermediate host of this tapeworm. *Hymenolepis villosoides* n. sp., *H. megarostellis* n. sp. (?), and *Aploparaksis fuligulosa* n. sp. are described from *Fuligula cristata*. The author also describes *Schistocephalus dimorphus* taken from *Podiceps nigricollis*.

A bibliography of 126 titles is appended.

The efficacy of carbolineum as an insecticide, E. Molz (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 7–12, pp. 183–203, pls. 4*).—This paper presents the results of investigations of the value of carbolineum as a contact poison in combating (1) scale insects (*Diaspis piri* and *Aspidiotus ostreæformis*); (2) the woolly apple aphis; (3) the grape vine gall mite (*Eriophyes vitis*); (4) the cabbage worm (*Pieris brassicæ*) and brown tail moth; (5) also as a stomach poison for caterpillars of the brown tail moth; (6) as a repellent for caterpillars; and (7) for subterranean insects.

Dosage tables, C. W. Woodworth (*California Sta. Bul. 220, pp. 33, pl. 1, figs. 3*).—This is the fifth of a series of fumigation studies conducted by the author (E. S. R., 11, p. 64; 15, p. 384; 16, p. 77; 23, p. 265).

"The study of the leakage of fumigation tents has now reached the point where it becomes possible to present tables of dosage so calculated that there may be approximately equal killing power under tents of varying degrees of leakage. If it were possible to figure on the tent always maintaining the same degree of leakage, a single dosage schedule would be sufficient, though different tents might not require the same schedule. The fact is, however, that variation in leakage proves to be the most important factor to be considered, and as long as it is neglected will result in errors in dosage several times greater than those that are liable to occur through mistakes in guessing the size of a tree, which heretofore has been supposed to be the most important cause of irregularity in results secured." It is stated that the full explanation of the method of calculation of the leakage factor and the detail of the experiments upon which it is based will be given in another bulletin.

"Only the very wide margin of safety, permitting the use of gas very much stronger than necessary to kill the scale insect, has enabled fumigators to obtain fairly uniform results, notwithstanding the variation in loss of gas through the tent. When trees are dosed according to leakage it will probably

be found safe to economize materially in the amount of chemicals used. In these tables, however, the full strength of chemicals now commonly used is indicated, since there must be considerable more data secured before it will be safe to recommend a material reduction. The use of these tables, therefore, simply insures greater uniformity in results."

The tables presented allow for 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, and 0.40 per cent leakage in fumigating for the black, red, and purple scales. Illustrations are given of a new rule prepared by the author which is graduated for use in measuring trees to be fumigated for the black scale and gives the dosage required for each degree of leakage. It is proposed to produce similar rules for the red and purple scales.

FOODS—HUMAN NUTRITION.

[Nutrition], J. B. E. HAEFFELÉ (*2. Cong. Aliment. Liége, 1911 [pt. 1]; Rev. Gén. Agron., n. ser., 6 (1911), No. 9, pp. 360–368*).—A discussion of food and nutrition topics with a summary of data regarding nutrition, dietary standards, and similar data.

Hungarian wheat flour, C. H. BRIGGS (*Northwest. Miller, 89 (1912), No. 4, pp. 203, 204, fig. 1*).—Samples of 3 kinds of Hungarian wheat (Tisza, Bácska, and Bánát) and various flours prepared therefrom were analyzed and used for baking tests. Hungarian wheats in general are medium hard winter varieties, spring wheat being generally grown only when the autumn sown crop has failed. The method of classifying the Hungarian flours is described and corresponding American grades indicated.

In the author's opinion, while it is unfair to generalize from a few tests only, it can safely be claimed that American flours in general do not suffer in comparison with Hungarian flours, while American springs and hard winters possess, at least for the crop of 1911, a strength decidedly above that of the Hungarian flours.

Concerning bread and pastry, E. GAUJOUX (*Rev. Hyg. et Pol. Sanit., 33 (1911), No. 12, pp. 1176–1180*).—The author discusses bakeshop products as sources of infection for tuberculosis and other diseases, and reports experiments in which the interior heat of bread during baking was measured. The conclusion was reached that the Koch bacillus can not survive in bread when baked, but may do so in forms of pastry which are subjected to less heat.

The author also points out the danger of external contamination from the time when the bread, etc., leaves the oven until it is consumed.

Salt-rising bread and some comparisons with bread made with yeast, H. A. KOHMAN (*Jour. Indus. and Engin. Chem., 4 (1912), Nos. 1, pp. 20–30; 2, pp. 100–106*).—Continuing earlier work (E. S. R., 25, p. 666), the results of an extended study of salt-rising bread and bread made with leaven are presented. The leaven in salt-rising bread is not yeast, as stated in literature on the subject, but consists of bacteria of certain sorts which aerate the bread by decomposing certain of it constituents, principally sugar, into gaseous products and not, as has been suggested, by producing acids which liberate carbon dioxid from bicarbonate of soda used in making the bread.

"The microbic flora involved varies greatly, depending upon the temperature to which the meal is subjected in setting the 'batter.' The organisms that predominate in the batter when it is made by stirring the meal into boiling milk or water are only occasionally found upon plates made from batters that were not subjected to temperatures which destroy nonspore-bearing organisms. The chief source of the bacteria is not the air and utensils, as has been sug-

gested in the literature, but the corn meal used in making the batter. One organism was isolated which in pure culture produces the gas necessary to properly aerate bread. This bacterium seems to be a member of the Coli group and was never found in batters that were heated to 75° C. It in all probability belongs to the same group as the organism described by Wolffin and Lehman, which they call *Bacillus lcrans*. This organism could be propagated in liquid media, such as milk, or could be grown in a batter and subsequently dried, to be used in the preparation of bread.

"When the liquid used in making the batter is taken sufficiently hot to bring the temperature of the batter to 75° C. or higher, certain spore-bearing organisms prevail which readily produce the gas necessary to aerate bread. These bacteria soon lose their gas-producing power when kept in liquid media or when transferred to fresh media at intervals of 12 to 24 hours. From this fermenting batter no culture was isolated that retained its ability to produce gas when kept in the liquid state. A dry product consisting for the most part of starchy material was prepared, however, which could be used at will in making uniform bread."

Bread made with leaven, i. e., the "Sauerteig" method, differs from salt-rising bread in that the leavening is due to yeasts and not to bacteria and it is a question whether in bread making by this method the bacteria present, some of which are gas-formers, are desirable or not. The 2 breads differ also in that salt-rising bread is made from fresh materials each time, while in making leavened bread a portion of the dough is saved to start the fermentation of the next baking.

"The gases produced by the salt-rising bacteria, as found in these experiments, consist of nearly $\frac{2}{3}$ hydrogen and rather more than $\frac{1}{3}$ carbon dioxid and no hydrocarbons.

"The losses of materials, due to decomposition and volatilization of some of the constituents, are much smaller in salt-rising bread than in bread made with yeast, and the losses in the latter vary with the amount of fermentation to which it is subjected. The difference in the losses of materials in the preparation of the 2 kinds of bread is to be explained by the fact that (1) there is no alcohol found in the former; (2) that owing to inherent difference in the nature of the ferments involved it is subjected to far less fermentation; and (3) the gases are much lighter."

The occurrence of some organic bases in flesh of wild rabbits, K. YOSHIMURA (*Biochem. Ztschr., 37 (1911), No. 5–6, pp. 477–481*).—According to the author's study, the flesh of wild rabbits contained 2 gm. creatin, 0.04 gm. hypoxanthin, and 2.23 gm. carnosin per kilogram. Xanthin was also present.

The lutein of hen's egg yolk, R. WILLSTÄTTER and H. H. ESCHER (*Hoppe-Seyler's Ztschr. Physiol. Chem., 76 (1912), No. 2–3, pp. 214–225, pl. 1*).—According to the authors' studies, lutein from egg yolk is identical in chemical composition and properties with zanthophyll and with lutein of vegetable origin. It differs from carotin with reference to its behavior when treated with ethyl alcohol or methyl alcohol and gasoline.

The banana as a foodstuff, K. THOMAS (*Arch. Anat. u. Physiol., Physiol. Abt., 1910, Sup., pp. 29–38; abs. in Zentbl. Physiol., 25 (1911), No. 21, p. 1001*).—According to the author, the degree of ripeness of the banana influences the thoroughness of digestion, 11.4 per cent of overripe fruit, 8.93 per cent of ripe fruit, and 22.32 per cent of half ripe fruit remaining unabsorbed. Bananas can not long be taken with relish when they constitute the sole article of diet. The author does not regard the banana as a general foodstuff since nitrogen equilibrium is not obtainable with it.

The tannin-colloid complexes in the fruit of the persimmon (Diospyros), F. E. LLOYD (*Biochem. Bul., 1 (1911), No. 1, pp. 7–41, pls. 3*).—The data here presented have for the most part been previously noted (E. S. R., 26, p. 310).

Olive oil, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 229, pp. 15*).—Of 152 samples of olive oil examined, 139 were found to be genuine. Standards for olive oil are proposed.

Distribution of sand in ground cinnamon, G. KAPPELLER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 12, pp. 729, 730*).—The analytical data reported did not indicate that there is a tendency for any sand, which appears in powdered cinnamon, to accumulate in the lower portion as has been claimed.

Some objections to the use of alum baking powder, W. J. GIES (*Jour. Amer. Med. Assoc., 57 (1911), No. 10, pp. 816–821*).—Upon the basis of his own investigations and those of his associates (E. S. R., 25, p. 573), and experimental data which he has interpreted, the author discusses the use of alum in baking powder. It is his opinion that the observations summarized justify the general conclusion that "unless it can be shown definitely, and beyond a reasonable doubt, that aluminized foods are harmless, the use in food of such aluminum carriers as alum baking powder should be prohibited by law in the interest of conservation of the best of our natural resources—the public health."

The adulteration of foods—detection and prevention, A. BEYTHIEN (*Samml. Chem. u. Chem. Tech. Vorträge 16 (1910–11), pp. 1–140*).—An important summary and digest of data.

The necessity for new legislation regarding saccharin, C. VON SCHEELE (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 4, pp. 273–285*).—A consideration of legislation regarding the use of saccharin in food in Sweden and in other countries, and a plea for a tariff upon its importation into Sweden.

The use of antiseptics in the preparation or preservation of food materials (*Ann. Falsif., 4 (1911), No. 38, pp. 646, 647*).—A summary of the exceptions permitted under the French pure food law of 1905.

Report of chemist, J. O. HALVERSON (*Bul. Dept. Food and Drug Insp. Mo., 3 (1911), No. 7–9, pp. 96, fig. 1*).—Of the 892 samples of foods, drugs, and medicines examined, 56.8 per cent were not passed.

The lunch room, P. RICHARDS (*Chicago, 1911, 1. ed., pp. 190, pl. 1, figs. 13, dgms. 40, charts 15*).—This volume takes up plans, equipment, management, and accounting of lunch rooms, the sale of foods, coffee, tea, etc., and gives a collection of bills of fare. Recipes for dishes considered particularly suited to lunch room trade make up the bulk of the volume.

Some questions of metabolism and nutrition, A. GIGON (*München. Med. Wchnschr., 58 (1911), No. 25, pp. 1343–1347*).—From a summary of data and the results of his own experiments, the author concludes that he has proved with certainty that the greater part of the carbon of protein remaining after the cleavage of urea is used by the normal body for fat formation, a smaller part being used for carbohydrate formation.

Studies in nutrition—IV, The utilization of the proteins of the legumes, L. B. MENDEL and M. S. FINE (*Jour. Biol. Chem., 10 (1911), No. 6, pp. 433–458*).—Soy bean flour free from starch, a product prepared from the white bean by thoroughly disintegrating the cells and dissolving and washing out the starch, phaseolin (a protein isolated from the white bean), and an uncoagulated globulin from the garden pea, were the materials selected for study.

In comparison with vegetable proteids used in earlier studies of this series (E. S. R., 26, p. 358), the legume products were found to be less well utilized.

"The unfavorable results with the soy bean and white bean preparations can be explained only in part by the presence of cellulose and hemi-cellulose in these products. Such considerations can not be applied to the data for phaseolin and pea globulin. . . . The observations regarding the soy bean are of special interest in view of the fact that this product has lately been introduced quite widely as an adjuvant to the dietary of diabetics."

Attention is called to the desirability of further work on the isolated legume proteins, and on the influence of indigestible nonnitrogenous materials upon the utilization of meat.

Differences in the tryptic and peptic cleavage of casein, paracasein, and calcium paracasein of cow's milk and goat's milk, J. Hösl (*Über Unterschiede in der tryptischen und peptischen Spaltung des Caseins, Paracaseins und des Paracaseinkalkes aus Kuk- und Ziegenmilch. Inaug. Diss., Univ. Bern, 1910, pp. 31*).—According to the author's artificial digestion experiments, paracasein from both cow's milk and goat's milk was more easily and more thoroughly digested with pepsin-hydrochloric acid than was casein.

Creatin and creatinin metabolism in dogs during feeding and inanition with especial reference to the function of the liver, Caroline B. Towles and C. Voegtlin (*Jour. Biol. Chem., 10 (1911), No. 6, pp. 479–497*).—According to the authors' conclusion, "the more or less constant excretion of creatinin in an animal on a fixed diet is explained by the constancy of the 3 factors which determine it, viz, production in the course of catabolism, destruction through the action of enzyms, and kidney secretion.

"In the dog creatinin and creatin are not true end-products of metabolism. That portion of these substances which appears in the urine is due to the fact that it is excreted by the kidney before destruction occurs.

"It is shown that the liver does not play the important rôle in reference to the creatin metabolism that has been ascribed to this organ.

"The occasional appearance of creatin in the urine after creatinin administration, as well as the occasional increase of urinary creatinin after creatin administration, suggests the possibility of creatinin hydrolysis being a reversible reaction in the animal organism."

Concerning the digestion of fat, S. von Pesthy (*Biochem. Ztschr., 34 (1911), No. 1–2, pp. 147–169; abs. in Chem. Zentbl., 1911, II, No. 10, p. 705*).—According to the author's conclusions, the amount of glycerin liberated is an accurate measure of fat cleavage, while the determination of the fatty acids often does not give reliable data. Fat cleavage noted in the stomach is not ascribable to intestinal enzyms which have regurgitated into the stomach, since they lose their activity in the acid stomach contents. Both components of fat, namely, glycerin and fatty acids, are found in the intestinal tract but not in proportion to the chemical formula for fat.

Experiments on the nutritive value of phosphorus compounds, W. Heubner (*München. Med. Wchnschr., 58 (1911), No. 48, pp. 2543, 2544*).—In experiments with animals, no differences in phosphorus gains were noted when phosphates and lecithin were supplied in comparison. Additional experiments are planned.

The influence of taking food upon gaseous exchange and energy metabolism, A. Gigon (*Pflüger's Arch. Physiol., 140 (1911), No. 11–12, pp. 509–592*).—From his own investigations and a digest of data on the subject, the author concludes that the body carries on its fundamental metabolic process independent of the act of taking food.

Digestion involves a certain amount of work, and even when fasting, the digestive organs perform a little work. Under ordinary conditions as regards nourishment, and also when the body possesses a store of glycogen, intermediate metabolic changes take place when either carbohydrates or proteids are sup-

plied. Sugar is changed in part to fat, and carbohydrates and fat are both formed from protein, fat being stored. Each nutrient has a pronounced specific effect which is manifested much less through energy changes than through changes of matter. These specific effects are noted whether the foodstuffs are taken alone or together. The law of isodynamic proportions, the author concludes, does not apply to the immediate uses of food as manifested in the formation and storage of reserve materials.

Studies on water drinking, VIII–X, H. A. MATTILL and P. B. HAWK (*Jour. Amer. Chem. Soc., 33 (1911), No. 12, pp. 1978–2032*).—Full details are given of 3 papers previously noted from brief summaries (E. S. R., 25, p. 572), as follows:

The utilization of ingested fat under the influence of copious and moderate water drinking with meals (pp. 1978–1998); the distribution of bacterial and other forms of fecal nitrogen and the utilization of ingested protein under the influence of copious and moderate water drinking with meals (pp. 1999–2019); and fecal output and its carbohydrate content under the influence of copious and moderate water drinking with meals (pp. 2019–2032).

The potassium, sodium, and chlorin content of plain and striated muscles of different animals, A. COSTANTINO (*Biochem. Ztschr., 37 (1911), No. 1–2, pp. 52–77*).—Muscles from a number of farm and laboratory animals and poultry were studied.

The water content of the nonstriated muscles, the author concludes, is greater than that of the striated. There are undoubtedly differences in the sodium and potassium quantity of the 2 classes of muscles, but no fixed rule can be given to describe them. Other conclusions have to do with specific variations in the muscles studied.

Concerning metabolism in old age, R. UHLMANN (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 3 (1911), No. 3, pp. 239–244*).—The income and outgo of nitrogen was determined with a woman 90 years old, in good health except for the infirmities of age, and weighing 57.2 lbs.

On an average the simple mixed diet which consisted of milk, eggs, bread, rice, and potato, did not differ materially from her accustomed diet, and supplied 25.65 calories per kilogram of body weight. The average nitrogen consumption in a 6-day period was 4.4 gm., the average daily excretion in the urine was 2.9 gm. and in the feces 1.2 gm., or a daily gain of 0.3 gm. of nitrogen. Data are also given for the metabolism of another period of 2 days, in which the simple diet contained a proprietary foodstuff containing some predigested protein. According to the author, the amount of nitrogen required was about one-third of the normal quantity, the low value being due in part to diminished absorption but chiefly to low functional activity of body cells in general.

Some observations on body temperature, P. DAVIDSON and N. D. WALKER (*Jour. Roy. Army Med. Corps, 17 (1911), No. 3, pp. 263–274*).—It being a well-known fact that body temperature normally rises during muscular activity, the authors attempted to determine this normal rise during marching so that it might be possible to determine when a rise of temperature under such conditions is to be considered pathological. The body temperatures of 5 subjects were taken per rectum at hourly intervals on days which included 5 hours of marching, and conclusions were based on the average of results.

In general, the authors found that the amount of exertion did not cause much change in the body temperature, nor did such variations of clothing or of the external temperature as the experiments included. The effect of eating was usually, though not invariably, to raise the temperature slightly. The men in question were all used to walking, so that the question of training did not

enter in, nor did that of fatigue. Individual idiosyncrasies were comparatively slight. In the opinion of the authors, the optimum temperature for marching may vary between 37.8° and 38.3° C. Similar observations made with subjects riding bicycles and playing squash rackets showed much the same general results. Data obtained with soldiers in India are discussed and compared with the experiments reported.

How to prevent typhoid fever, L. W. Page, J. R. Mohler, and E. F. Smith (*U. S. Dept. Agr., Farmers' Bul. 478, pp. 8*).—This is a statement of the nature of typhoid fever and the means of preventing it, and was originally prepared with special reference to the needs of employees of this Department in field service. Antityphoid vaccination as a method of protection against the disease is recommended for well persons exposed to field service conditions.

ANIMAL PRODUCTION.

On the value of feeds of animal origin for herbivorous animals, F. Honcamp, B. Gschwendner and D. Engberding (*Landw. Vers. Stat., 75 (1911), No. 3–4, pp. 161–184*).—This reports digestion experiments in feeding animal products, such as fish and meat meals, to sheep, with clover hay as a basal ration. The following table gives the percentages of air-dry matter and the coefficients of digestibility of the feeds used:

Analyses and digestion coefficients of animal products.

Kind of meal.	Composition.					Coefficients of digestibility.			
	Crude protein.	Pure protein.	Fat.	Nitrogen-free extract.	Ash.	Organic matter.	Crude protein.	Fat.	Nitrogen-free extract.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Herring meal (dry matter basis)	58.30	56.28	13.57	3.98	23.65	93.7	87.7	97.4	49.2
Whale meal (dry matter basis)	71.08	58.22	23.74	2.51	2.94	86.8	75.1	100.0	36.7
Meat meal, I (dry matter basis)	54.48	40.54	22.66	2.30	20.56	51.0	78.9	93.0	.....
Meat meal, II (dry matter basis)	62.61	54.22	8.80	2.89	25.70	87.3	84.1	99.2	.....
Blood meal (water insoluble)	86.61	86.20	.21	.....	4.38	87.0	86.4	100.0	.....
Blood meal (water soluble)	89.09	81.50	.62	.....	2.52	96.5	96.5	100.0	.....

On the utilization of dried yeast for preparing molasses feeds, O. Fallada (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 5, pp. 709–714*).—Analyses are reported of dried yeast and a mixture of dried yeast and molasses.

After standing 10 weeks there was no appreciable loss of nutriment in the yeast-molasses mixture, and it is recommended for stock feeding. The analysis of the mixture in a fresh condition in the proportions of 1 kg. of molasses to 800 gms. of dried yeast is as follows: Water 13.71, protein 20.81, amino acids 8.19, fat 1.8, sugar 28.8, invert sugar traces, other nitrogen-free extracts 18.09, fiber traces, and ash 8.6 per cent. The methods of making these analyses are also discussed.

The toxic principle in cruciferous cakes, C. Brioux (*Ann. Sci. Agron., 3. ser., 6 (1911), I, Nos. 4, pp. 241–282; 5, pp. 321–337; abs. in Rev. Gén. Agron., n. ser., 6 (1911), No. 8, pp. 317–319*).—The optimum temperature for the production of toxic substances in mustard cakes used in stock feeding was about 37° C. It is pointed out that mustard cakes must be fed with discretion and

must be given in a dry condition and only in small quantities until the animal becomes accustomed to them. If any intestinal irritation results they should be discontinued.

It is also stated that treating the cakes with boiling water destroys the enzyms that cause the production of mustard toxin.

The availability of phosphorus compounds in rations for ruminants, G. FINGERLING (*Biochem. Ztschr., 37 (1911), No. 3–4, pp. 266–271*).—Growing lambs and lactating goats were given phytin, lecithin, and other phosphorus compounds, but there appeared to be no essential difference as to their digestibility. Further work showed that all phosphorus compounds were better utilized in tender grass and in concentrated grains than in hay. Further work along this line is promised.

[Registered feeding stuffs] (*Kansas Sta. Feeding Stuffs Buls. 17–22, pp. 4 each*).—These contain a list of manufacturers and the name of feeding stuffs registered for the months of December, 1910, and January, February, March, April, and May, 1911, respectively.

Concentrated commercial feeding stuffs, J. D. TURNER and H. D. SPEARS (*Kentucky Sta. Bul. 156, pp. 63–180*).—This reports the results of the state feed inspections, including the protein and fat content of the following feeds: Alfalfa meal, beef scrap, ground bone, dried beet pulp, corn bran, corn chop, crushed corn, corn meal, gluten feed, hominy meal, cotton-seed meal, linseed meal, rye feed, wheat by-products, distillers' dried grains, brewers' dried grains, and mixed feeds. In some cases the number of weed seeds was also determined.

"The feeds in which we found the higher amount of sand were mixed feeds containing finely ground materials and masked in other ways, and they were found to contain various amounts of screenings, weed seeds, etc. This would seem to indicate that the sand had found its way into the feed by the use of sweepings and screenings, and probably not by the intentional addition of sand.

"The ash of the various feeds was also determined and . . . it is seen that those feeds containing high percentages of this constituent are those running high in the amount of sand present. Whether sand or soil is added intentionally or not, it is evident and the fact remains that such materials should not be in feeding stuffs in appreciable quantities, at least."

Report of commercial feed stuffs, J. E. HALLIGAN (*Louisiana Stas. Feed Stuffs Rpt. 1910–11, pp. 133*).—This presents the results of feed inspection for the season of 1910–11. Analyses are reported of 10,399 samples of cotton-seed meal, rice bran, rice polish, wheat bran, shorts, corn chop, molasses feeds, brewers' grains, beef scrap, alfalfa meal, corn-and-cob meal, hominy feed, and mixed feeds.

Feed stuff analyses, H. B. MCDONNELL ET AL. (*Md. Agr. Col. Quart., 1911, No. 54, pp. 8*).—Analyses are reported of beef scrap, gluten feed, meat meal, cotton-seed meal, hominy feed, maize oil meal, linseed meal, and proprietary mixed feeds.

Stock feeds, G. M. MACNIDER and H. HILL (*Bul. N. C. Dept. Agr., 32 (1911), No. 11, Sup., pp. 68*).—This presents the results of the annual feed inspection for 1911. Analyses are reported of wheat bran, shorts, middlings, red dog flour, shipstuff, wheat screenings, rye middlings, rice meal, rice bran, alfalfa meal, dried beet pulp, corn chop, hominy feed, cotton-seed meal, peanut meal, peanut hulls, old process linseed meal, gluten feed, cracked corn, blood meal, meat meal, mixed feeds, condimental stock feeds, and poultry tonics.

Winter steer feeding, 1909–10 and 1910–11, J. H. SKINNER, F. G. KING and H. P. RUSK (*Indiana Sta. Bul. 153, pp. 3–67*).—A continuation of earlier work (E. S. R., 22, p. 269), and containing data on the value of corn silage

and clover hay as a roughage for fattening steers, the best methods of utilizing the roughage produced on the farm, influence of cotton-seed meal as a supplement, and a comparison of the relative profits from long and short feeding periods. The feeding tests were undertaken in 1909–10 and 1910–11, using in general lots of 10 steers each. The tests are described in detail and the daily gains per month are given.

The following table shows the results of feeding clover hay and corn silage as supplements to shelled corn and cotton-seed meal as a basal ration for steers:

Steer feeding tests.

Lot.	Supplementary feed.	Year.	Average daily gain.	Cost of feed per pound of gain.	Initial value per pound.	Selling value per pound.	Profit or loss per steer (without pork).
			Pounds.	*Cents.*	*Cents.*	*Cents.*	*Dollars.*
1	Clover hay and corn silage	1909–10	2.58	9.76	4.65	7.25	+13.02
2	Clover hay	do	2.28	10.98	4.65	7.30	+10.12
3	Corn silage	do	2.33	9.42	4.65	7.20	+14.64
4	Clover hay and corn silage	do	2.63	9.56	4.65	7.60	+18.09
1	do	1910–11	2.59	8.82	5.00	5.95	− 0.50
2	Clover hay	do	2.43	9.71	5.00	5.85	− 4.57
3	Corn silage	do	2.37	8.49	5.00	5.75	− 1.34
4	Clover hay and corn silage	do	2.42	8.71	5.00	5.85	− 0.86

In the spring of 1910 the market price of all classes of meat animals was abnormally high, while in the spring of 1911 the market was very unsatisfactory. On including the amount of pork produced, the balance sheet for 1910–11 test shows a profit for each lot. Labor and interest on investment were not taken into consideration in estimating the cost of gain.

In a study of different proportions of cotton-seed meal on a basal ration of shelled corn, clover hay, and corn silage, 2.5 lbs. of cotton-seed meal per day per 1,000 lbs. live weight was found to be more profitable than only half as much cotton-seed meal. This was due quite largely to a more rapid gain, as the cost of making gains was not greatly affected. With corn above 40 cts. per bushel the cost of gain was less where the larger amount of cotton-seed meal was fed, but the reverse was true when corn cost less than 40 cts.

In a similar test but with the silage omitted the rate of gain and the feed required to make a pound of gain was very little affected. The cost of gains was greatly increased by the use of the larger amount of the concentrate, but a better finish was produced. The profit per steer was less in 1909–10 on the larger amount, but in 1910–11 the profits were in favor of it, due to the changed market conditions.

The short-fed cattle in the trials of 1909–10 made more rapid gains than the long-fed. Corn silage and clover hay proved efficient for carrying the heavy flesh feeders for the first part of the feeding period. The cattle in the trial of 1910–11, carried on clover hay and corn silage and then short fed, made less gain and returned a shorter profit than the long fed. One lot of 15 short-fed cattle in 1909–11 was marketed and returned a profit, including pork, of more than $28 per steer, while the cattle used in the second trial and marketed 120 days later returned a profit of less than $10 per head, notwithstanding the fact that the latter made more rapid and cheaper gains than have ever been made by any other lot of steers fed experimentally at the station. This was due in part to the condition of cattle when started on feed in the second trial, but more largely to the influence of market conditions.

Among conclusions drawn are the following:

"The kind of cattle should determine to a large extent the length of time to feed." "Corn silage in all rations where it was fed proved a more economical and a more profitable roughage than clover hay alone for fattening cattle." "The addition of corn silage to a ration of shelled corn, cotton-seed meal, and clover hay increased the rate, and decreased the cost of gain, and effected equally as good finish on the cattle." "In order to induce sufficient grain consumption to insure satisfactory gains it was necessary to limit the amount of silage fed during the latter part of the feeding period." "The consumption of frozen silage scoured the cattle."

Sheep management, F. KLEINHEINZ (*Madison, Wis., 1911, pp. XIII+225, pl. 1, figs. 59*).—A brief guide to practical problems in sheep management which confront those engaged in sheep husbandry. The information is based on the many years' experience as a shepherd of the author, who has had charge of the flock at the Wisconsin Station since 1890.

Mutton finishing on silage, J. E. POOLE (*Breeder's Gaz., 60 (1911), No. 25, pp. 1296, 1324, 1325, figs. 4*).—Details are given of the methods practiced where feeding silage to sheep has been undertaken on a large scale.

Studies on the strength and elasticity of the wool fiber.—I, The probable error of the mean, J. A. HILL (*Wyoming Sta. Rpt. 1911, Sup., pp. 139*).—Continuing earlier work (E. S. R., 21, p. 73), the stretch of 5,000 and the breaking strength of 59,400 wool fibers were measured. The fibers were taken from 26 fleeces, representing a wide range as to character of fiber, breed of sheep, and geographical distribution.

In a single sample the breaking strain and the relation between breaking strain and area of cross section was found to be more variable than the relation between the two characters, when subsamples of 100 fibers each were drawn from unmixed samples. By this method, however, more than half of the means of the hundreds differ from the means of the thousands by more than the probable error of the means of the hundred. The variation of the means of subsamples of 1,000 fibers were determined as drawn from unmixed samples, but all of this work pointed to the conclusion that the probable error calculated by the formula $0.6745\sigma/\sqrt{n}$, where σ is the standard deviation and n the number of variants, is of little or no value as a measure of the accuracy of the means obtained by the methods which hitherto have been used in this investigation. It is thought that the fault may be that the groups of hundreds and thousands studied have not fulfilled the conditions necessary to make them random samples. The investigations were continued by changing the method of drawing the fibers, but the study of deviations of the means in all cases furnished evidence that the changed methods of drawing subsamples still failed to follow the laws of the means of random subsamples.

A final test was made to determine whether or not very small samples of wool which contained barely the total number of fibers tested can be so mixed that the accuracy of the means of thousands is described by the probable error calculated by the standard deviation of the individual measurements, and also to determine whether these means of thousands are accurate enough to be used in measuring the effect of change of condition on the strength of wool. The result, however, was somewhat contradictory, and if it can be said to prove anything at all, it is that mixing very small samples before testing can not be depended upon to give means of thousands whose theoretical probable errors are good measures of their accuracy.

Tables are given which show the comparison of the theoretical with the true probable errors of the means of hundreds for all the samples studied, and comparisons of the means of thousands for samples from which 5,000 or more fibers

were measured. They showed to what extent the true as compared with the theoretical probable error was reduced by mixing the sample before drawing the subsamples for testing.

After measuring the stretch on 5,000 fibers it was also concluded that mixing before drawing subsamples in measuring stretch would have no more effect in making the facts coincide with the theory than it did in the case of breaking strain. The frequency constants showed that stretch was more variable than breaking strain, that 80 per cent of the deviations exceed the theoretical probable error, and that the difference between the highest and the lowest means of hundreds is over 40 per cent, all of which shows an exceedingly high degree of variability in stretch of wool fiber.

The author states that results of these studies are for the most part negative and in many points self-contradictory, but they at least show the necessity of painstaking experiments in developing and trying out methods for use in wool investigations. It shows that under ordinary room conditions and mixtures the probable error calculated from the standard deviations of the individual fibers is not a good measure of the variability of the means of hundreds and thousands for both breaking strain and stretch; that the variation of the means of hundreds is so great that the mean of this small number of tests is a very inaccurate measure of the mean of a sample of wool containing only a few thousand fibers; and that the means of thousands can scarcely be used for anything more than the most general work.

"There are, moreover, certain classes of work, e. g., the comparison of the strength of wool from 2 breeds of sheep, or even of 2 sheep, in which it will be necessary to measure the diameter of the fiber, but before this is attempted there should be a careful study made of the variability of the diameters of single fibers by taking measurements at small intervals throughout the length of fibers as well as on different fibers. Such a study as this might throw some light on the question of changes in cross-section due to permanent elongation before rupture, which is one of the difficulties of finding the relation between breaking strain and cross-section."

Report on seven experiments on the feeding of pigs, W. Stevenson (*West of Scot. Agr. Col. Bul. 57, 1911, pp. 253–334*).—This is a report of a series of experiments intended to illustrate the best methods of utilizing skim milk and whey for feeding pigs.

The supremacy of the American hog, J. O. Armour (*Breeder's Gaz., 60 (1911), No. 25, pp. 1290, 1291, 1337, 1338, 1340, 1342, figs. 10*).—A statistical account of the swine industry in the United States.

Slaughtering operations and comparisons (*Cincinnati Price Current, 69 (1912), No. 1, pp. 1, 2*).—A statistical review of the growth and extent of hog slaughtering operations in the West from 1872 to 1911.

Horses and horse breeding, H. K. Bush-Brown (*Amer. Breeders Mag., 2 (1911), Nos. 2, pp. 85–97; 3, pp. 175–188, figs. 25*).—A discussion of the Celtic, Prezewalskii, forest, Arab, and Thoroughbred types of horses, with remarks concerning their use for foundation stock and breeding. The inheritance of callosities is discussed.

The book of the horse, Sa'adat Yar, trans. by D. C. Phillott (*London 1911, pp. XX+83; rev. in Nature [London], 88 (1911), No. 2197, pp. 172–173*).—A translation of a classic work on the horse by a native of British India.

The horse: His breeding, care, and use, D. Buffum (*New York, 1911, pp. 160, figs. 8*).—A popular work on buying, breeding, and managing horses.

Breeding poultry for egg production, R. Pearl (*Maine Sta. Bul. 192, pp. 113–176, figs. 9*).—A review is given of the history of the work at the Maine

Station in the experimental breeding of poultry with reference to egg production, with some additional data not hitherto published regarding obscure and doubtful points of interpretation.

It is concluded that trap nesting for the purpose of improving egg production by the selection of the best layers has not that degree of practical usefulness and importance which it was popularly supposed to have some 10 years ago. Its only profitable function in practical or commercial poultry keeping, as distinguished from experimental, is deemed to be in connection with special needs or problems, as in the work of the fancier who desires to keep individual pedigrees of his stock.

In the interpretation of earlier work the author finds that the percentage of mortality fluctuated in amount from year to year. These variations are accounted for by differences in general environmental factors and to accidents. There was a general trend downward, however, during the period 1899 to 1908, when egg production was showing a slightly downward trend. There is no evidence that either artificial incubation or any other environmental condition affected adversely the constitutional vigor of the strain. The percentage of infertile eggs was distinctly high, because the eggs for hatching were used soon after mating, being 19.3 per cent in females of high fecundity lines and 18.8 per cent in those of low fecundity. The hatching quality as indicated by the percentage of fertile eggs hatched was somewhat below what may be considered normal for the station's stock at the present time. Taking all the records together, in the high fecundity lines it required 2.6 eggs in the incubator in 1911 to produce 1 chicken 3 weeks old, while in the low fecundity lines it required 3.2 eggs to make 1 chick 3 weeks old. There was no substantial difference between the females of the high and low fecundity lines in respect to hatching records.

An experiment in out-crossing, involving a large number of individuals, indicated that the infusion of new blood failed to produce any change in the egg production of the progeny. Therefore, it is concluded that the amount of inbreeding practiced during the mass selection had no unfavorable influence on either egg production or on the general vitality of the stock. As there was no increase in egg production by mass selection in the laying year 1907–8, a new plan of breeding was adopted as a working hypothesis, having for its basis the genotype concept of Johannsen, which is explained in detail.

Data are presented showing that it has been possible to isolate and breed stock strains or lines in which high fecundity has not been changed during 4 generations at least. This indicates that high fecundity and low fecundity segregate in accordance with Mendelian principles.

Poultry notes, 1910, R. PEARL (*Maine Sta. Bul. 193, pp. 177–200, figs. 8*).—A report of progress in the poultry work at the station in 1910.

The brooder which had been used proving unsatisfactory, a new type was devised which proved satisfactory. A description and working plans of the new brooder are given.

Experience has shown that the roosting closet was of no advantage and has been abandoned.

A study of the residual error of trap-nest records is presented in detail. With the old trap nests the residual error was 4.01, with the new 1.24 per cent. The relative amount of unrecorded egg production was not closely related to the total egg production. The absolute number of unrecorded eggs tended to increase as the nest eggs increased. During the first 2 years the tendency for the unrecorded production diminished relatively. The longer the same individual birds used the trap nest the smaller became the production of unrecorded eggs, which suggests that there is an element of learning in the

operation of trap nests, looked at from the standpoint of the bird. There are always a few which have to be taught to use the trap nest. The third year seemed to furnish a contradiction to the first 2 years, though this may be accounted for by the behavior of certain cross-bred birds in respect to broodiness.

It is stated that there will also remain some unrecorded egg production because of laying on the floor of the house, laying in broody coops, and dropping eggs whole on the roosts.

A brief review is given of a portion of the more technical scientific work with poultry already noted from other sources (E. S. R., 24, p. 675; 25, p. 77).

Live stock in Argentina (*An. Soc. Rural Argentina, 1910, Agr. and Live Stock, pp. 177, pl. 1, figs. 255*).—This contains an account of the meat trade, live-stock exhibitions, and statistics of the live-stock trade in Argentina.

The price of animals and animal products in 1910 and the first half of 1911 in 22 cities and markets in Switzerland (*Mitt. Bern. Statis. Bur., 1911, No. 2, pp. 101*).—This contains statistical tables and a brief account of the meat industry in Switzerland.

Text-book of animal breeding, G. Pusch (*Lehrbuch der Allgemeinen Tierzucht. Stuttgart, 1911, 2. ed., rev. and enl., pp. XV+480, figs. 219*).—In this new edition (E. S. R., 16, p. 586) sections treating on the following topics have been added: The mind of animals, unnatural sexual instinct, artificial impregnation, Mendelian laws, inheritance of acquired characters, and the influence of care and feed upon the mature form of the animal.

On the relation of the mechanism of the hind and fore limbs of cattle to the differences of the low and highland breeds, H. Behm (*Untersuchungen über den Mechanismus der Hinter- und Vorderextremität des Rindes in seiner Verschiedenheit bei Tieflands- und Höhenschlägen. Inaug. Diss., Univ. Bern, 1911, pp. 101, pls. 4*).—From an anatomical study of the vertebral column and its correlations, the author concludes that the sloping crupper of the lowland breeds of cattle is caused by the mechanical effect of feeding on level ground, whereas pasturing on sloping ground tends to raise the posterior extremity of the coccyx bone. The coccyx in calves of both breeds is nearly horizontal. Measurements which were made on different cattle are given, and a bibliography is appended.

The anatomy and histology of the psalterium in ruminants, E. Schwarz (*Zur Anatomie und Histologie des Psalters der Wiederkäuer. Inaug. Diss., Univ. Bern, 1910, pp. 43, figs. 7*).—As a result of his studies the author concludes that resorption as well as the mechanical preparation of the food takes place in the psalterium.

On the occurrence, ancestry, and origin of rumpless fowls, G. Libon (*Ansichten über das Vorkommen, die Abstammung und Entstehung des schwanzlosen Haushuhnes. Inaug. Diss., Univ. Bern, 1911, pp. 53, pls. 4*).—Anatomical and embryological studies showed that this pathological character is due to the atrophy of the uropygium and caudal vertebræ. Though the rudiments of the caudal vertebræ can be seen in the young embryo, they disappear between the ninth and tenth day of incubation.

A bibliography is appended.

A case of yolk formation not connected with the production of ova, O. Riddle (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 22 (1912), No. 2, pp. 107–111*).—An account of the formation of true yolk in spaces within the connective tissues which lie externally to the follicular membrane of capsules which had previously liberated ova. This peculiar yolk formation was found in the case of 6 or 8 ovaries of full-grown hens.

DAIRY FARMING—DAIRYING.

Dairy farming, J. MICHELS (*Milwaukee, Wis., 1911, 3. ed. rev., pp. 296, pl. 1, figs. 87*).—A practical work on dairying, intended to be used as a text and reference book in American dairy schools, and which contains results of the author's experience in dairy farming and as a teacher of dairy husbandry in agricultural colleges.

Soiling and summer silage, H. O. DANIELS (*Amer. Cult., 73 (1911), No. 49, pp. 2, 3, fig. 1*).—This is a comparison of these 2 systems of furnishing succulent feed for dairy cows throughout the year, based on the experience of the author.

He found that growing clover and either oats, rye, or wheat for ensiling in June was a more economical and satisfactory method, and required less labor, than summer soiling for keeping up the milk supply when the summer pastures began to dry up in the summer time. In September, when the clover and rye or wheat silage has been used up the silo was filled with corn silage, which lasts until the summer silage is again ready for harvest. Details are given for raising the crops.

On the feeding value of fresh grass and hay made from the same, A. MORGEN, C. BEGER and F. WESTHAUSSER (*Landw. Vers. Stat., 75 (1911), No. 5–6, pp. 321–348*).—Analyses of fresh grass and hay indicated that the loss of organic matter through drying was slight. There was a loss of organic phosphorous when dried in the open air, but not when dried in an enclosed box. In tests with 3 sheep and 1 goat there was little difference in the milk flow or live weight, although the hay was not quite so readily digested as the grass. The greatest loss of nutrient material was in fat and pure protein. The decreased digestibility was due to the changed physiological condition of the hay.

The external characteristics of dairy cows of different breeds (*Cultura, 23 (1911), Nos. 270, pp. 74–93; 271, pp. 123–138*).—A study of conformation as a guide to the milking capacity of cows.

Red Polls as milkers, T. A. J. SMITH (*Jour. Dept. Agr. Victoria, 9 (1911), No. 11, pp. 778–781, fig. 1*).—This reports the milk yields of 13 Red Polled cattle kept at the tobacco farm of the department at Whitfield.

Concerning the nutritive value of the milk of buffaloes and cows, G. MAGINI (*Atti. R. Accad. Lincei. Rend. Cl. Sci. Fis. Mat. e Nat., 5. ser., 20 (1911), II, No. 8, pp. 439–443, pl. 1; Clin. Vet. [Milan], Rass. Pol. Sanit. e Ig., 34 (1911), No. 23, pp. 933–1000*).—Comparative analyses were made under corresponding conditions of the milk of cows and Indian buffaloes obtained in and about Rome.

The buffalo milk was found to contain considerably less water, one-third again as much fat, and more albuminoids and milk sugar. The author concludes that it is likely to become of increasing economic value in the Roman campagna.

The dirt content of evening and morning milk, F. REISS (*Molk. Ztg. [Hildesheim], 24 (1910), No. 88, pp. 1655, 1656*).—A number of tests showed that the morning milk as a rule had a higher dirt content than evening milk.

A preparation for increasing the secretion of milk, K. BASCH (*German Patent 238,995, Aug. 21, 1909; abs. in Chem. Ztg., 35 (1911), No. 127, Repert., p. 527*).—A note on a patented process for extracting from animal placentas a substance which induces milk secretion. It is claimed that it can be used for both animals and humans.

The problem of city milk supplies, P. G. HEINEMANN (*Pop. Sci. Mo., 80 (1912), No. 1, pp. 66–75, figs. 9*).—A popular article on the importance of having a pure milk supply. The fact is emphasized that consumers must be taught to realize that at present prices milk is a cheap food as compared with meat.

A review of practical methods for supervising the milk supply of cities, J. B. THOMAS (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 11, pp. 798–807*).—The different methods of collecting samples, keeping records, and supervising dairy farms are discussed.

A summary of milk regulations in the United States, E. H. SCHORER (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 11, pp. 847–856*).—The state and urban official regulations concerning the sale of milk are discussed from the standpoint of efficiency in increasing the supply of clean milk.

Practical municipal milk examinations, D. M. LEWIS (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 11, pp. 778–782*).—A discussion of the results of testing milk for streptococci, pus cells, dirt, and blood.

An outbreak of tonsilitis or septic sore throat in eastern Massachusetts and its relation to an infected milk supply, C. E. A. WINSLOW (*Jour. Infect. Diseases, 10 (1912), No. 1, pp. 73–112, figs. 5*).—This outbreak, which occurred in 2 different districts, was thought to be due to a carrier case. There was no well-defined case of tonsilitis among the dairy employees, although it occurred in the families, and the farms and cattle were systematically inspected by an expert veterinarian.

"The lesson to be drawn from the outbreak is that even a most carefully supervised milk supply is open to the danger of grave infection from carrier or unrecognized cases of disease. The only real safeguard against such catastrophes lies in pasteurization, carried out by the holding system and preferably in the final packages.

"Numerous outbreaks of similar throat disease have occurred in Great Britain, and have been clearly traced to infected milk supplies. From the English experience it appears that 'septic sore throat' is by no means rare as a milk-borne infection; and sanitarians in this country must add this to the list of dangers that surround a raw milk supply."

The Society of American Bacteriologists (*Science, n. ser., 35 (1912), No. 893, pp. 222–240*).—These pages consist of abstracts of some of the papers read at the Washington meeting, December, 1911, which relate to dairy bacteriology.

A comparison of streptococci from milk and from the human throat, E. C. Stowell and C. M. Hilliard (p. 223).—A study of a method for distinguishing between organisms isolated from these 2 sources led to the following conclusions:

"Streptococci from the human throat and from milk very generally ferment one or more of the sugars, dextrose, lactose, and saccharose, attacking them most readily in the order named. They do not generally ferment raffinose or mannite. The streptococci of the sore and the normal throat show no cultural differentiation in relation to the carbohydrates used. Virulence tests would perhaps have separated the 2 groups. Milk streptococci are much more facultative than throat strains in relation to the temperature at which they are grown. This is, perhaps, the most valuable information obtained as a differential feature between chained cocci from the 2 sources."

A study of thirty-five strains of streptococci isolated from samples of milk, G. F. Ruediger (p. 223).—*Streptococcus lacticus* could be differentiated from *S. pyogenes* by means of blood agar plates, and has no sanitary significance as it is found in nearly all samples of clean, soured, or fresh milk, and very often in the healthy milk ducts. *S. pyogenes,* on the other hand, is indicative of the existence of the inflamed condition of the udder of the cow.

A biometrical study of milk streptococci, J. Broadhurst (pp. 223, 224).—A comparative study of carbohydrate fermentation reactions based on streptococci isolated from milk plates made from samples of commercial milk in New York City. One hundred strains were isolated.

Casein media adapted to milk analysis, S. H. Ayers (pp. 229, 230).—A method of preparing casein media is given, which is thought to be of considerable value in bacteriological milk analysis. A study of the bacterial growth upon casein agar and on infusion agar led to the following results:

"The 24 hours' count at 37° on casein agar was almost always lower than on infusion agar when raw milk is being examined. When pasteurized milk was examined the casein plates showed a higher count in 37 per cent of the samples. After 6 days' incubation at 30° C., out of 50 samples of raw milk plated, 44 per cent of the samples showed higher counts on casein agar. With 50 samples of pasteurized milk, 78 per cent of the samples showed a higher count on casein agar. From a study of the bacteria from about 50 samples of both raw and pasteurized milk it seems that acid-forming bacteria do not develop quite as well on casein agar. It does, however, favor the growth of the alkali formers, the peptonizers, and inert bacteria.

"The number of peptonizing bacteria in a sample of milk may be determined directly from a casein agar plate. After counting the plate it should be flowed with tenth-normal lactic acid; this causes the precipitation of the casein, giving a white opaque plate except where the casein has been dissolved about a colony of peptonizing bacteria. There is then left a clear zone around the colonies of peptonizing bacteria which enables one to determine their numbers in the sample of milk under examination. It has been found from a study of a large number of samples that this method of determination is accurate."

A study of gas-forming bacteria in milk, L. A. Rogers and B. J. Davis (pp. 230, 231).—Cultures of gas-forming organisms were isolated from milk and milk products in various parts of the country, and studied with special reference to the relation to the fermentation of carbohydrates and the amount of gas and ratio of hydrogen to carbon dioxid. When plotted on the frequency basis this ratio gave four more or less distinct nodes. The proper classification of the cultures showed a close relationship between the ratio and the amount of gas. The gas ratio was further correlated in some cases with the fermentation of certain carbohydrates.

"The group giving a ratio 1:1.6 to 1:2 shows a distinctly greater ability to ferment saccharose, raffinose, and starch than the group giving the ratio 1:1.1. It is probable that these tentative groups are somewhat heterogeneous and that further refinement by the use of new test substances will bring out sharper distinctions."

Some actions of micro-organisms upon the constituents of butter, C. W. Brown (p. 231).—One lot of butter was made from cream pasteurized at from 160 to 170° F., while the other was not pasteurized. Both the churn and butter were placed in storage at from —3 to +3°. Fifty-seven species of bacteria and 31 species of yeast, besides molds, were isolated.

It was noticed "that 24 of the bacteria and 15 of the yeasts will grow on 12 per cent salt at 20° C. Four of these bacteria and 6 of these yeasts grow well on 12 per cent salt at 6°. The ratio of the number of species of liquefying bacteria to the number of nonliquefying bacteria isolated from ordinary agar is the same as the liquefying to the nonliquefying isolated from 12 per cent salt agar. Twelve per cent of salt has a much more inhibitive action upon the species of liquefying yeasts than it does upon the nonliquefying. The lactose in both the pasteurized and unpasteurized butter decreased from 0.315 per cent and 0.325 per cent to 0.285 per cent and 0.290 per cent, respectively, in 428 days; 50 per cent of the decrease in lactose took place within the first 10 days; when the butter was taken from storage at the end of 428 days and placed at room temperature very little further decomposition of lactose oc-

curred. The soluble nitrogen recorded in percentage of the total nitrogen in the butter increased in 428 days from 6.25 per cent and 7.69 per cent to 6.29 per cent and 7.84 per cent for the pasteurized and unpasteurized, respectively. The acidity of the pasteurized butter remained constant, while that of the unpasteurized increased from 25.5 to 33.9° (Fuller's scale). When the growth upon synthetic agar was compared with the growth upon the same agar to which 1 per cent butter fat—freed from impurities by melting and decanting—was added, 9 species of the bacteria showed a more luxuriant growth in the presence of fat, 11 were inhibited and 37 were indifferent, while 20 of the yeasts grew more luxuriant, 5 were inhibited, and 6 indifferent."

A bacteriological study of the milk supply of Washington, D. C., J. J. Kinyoun and L. V. Deiter (p. 231).—The milk was examined to ascertain the actual conditions of the milk supply during a period of 14 months. The average bacterial content for all samples was 9,300,000, and in no instance below 1,000,000. Fifty-five per cent contained *Bacillus coli* and *streptococci*. The examination of pasteurized milk showed that it was far from satisfactory.

The bacteriological improvement of a milk supply by other than laboratory means, H. A. Harding (p. 232).—Attention is called to the fact that the establishment of a maximum permissible germ content in market milk is undesirable; that bacteriologists must translate the results of their studies in terms of dairy practice, which may well take the form of a score card; and that any permanent improvement in the milk supply must rest on the conditions which make it more profitable to furnish a cleaner milk than to furnish a dirtier one.

Suggestion of a new method of stating composite results of bacterial milk counts, E. C. Levy (p. 233).—The average bacterial count of market milk samples is thought to be of little value. Therefore, a new method called the "bacterial index" is suggested, and is explained in detail.

The control of pasteurized milk by physical and bacterial standards, W. R. Stokes and F. W. Hachtel (pp. 233, 234).—The importance of the control of the pasteurization of milk and the milk after it has been pasteurized is emphasized. The percentage of cases in which colon bacilli were present before and after pasteurization is given.

"The article then considers the recontamination of pasteurized milk, showing by the work of Koehler and Tonney that while the average count from a large number of freshly pasteurized milks was only 125,000, yet the average count from pasteurized milk 1 day old was 602,000 bacteria per cubic centimeter. Some of this milk showed counts varying between 1,000,000 and 4,800,000 per cubic centimeter. These authors think that this recontamination can best be obviated by a strict enforcement of a maximum standard for the temperature of milk of 50° C.

"The conclusions are that the physical and bacterial standards of Koehler and Tonney are reasonable, and that the question of an additional safeguard establishing a maximum amount in which colon bacilli can be present in pasteurized milk is still open for debate."

Recent developments in pasteurization of milk for a general market, E. H. Schorer (pp. 234, 235).—A general discussion of the necessity for pasteurizing market milk. "The most efficient method of pasteurization is that under official supervision, controlling the quality of the milk pasteurized, pasteurization in the sealed bottle at 145° F. for 30 minutes, allowing at least 30 minutes to heat the milk to the pasteurizing temperature, and labeling such milk properly. This will insure sufficient temperature to destroy pathogenic bacteria, will inactivate the ferments but little, leave a good cream line, and give a preferred milk."

Milk and cream testing and grading dairy produce for school, farm, and factory, G. S. THOMSON (*London, 1911, pp. XX+204, pl. 1, figs. 70; abs. in Dairy, 23 (1911), No. 276, p. 326*).—This book contains directions for milk inspectors, dairymen, and others who wish to test cream and milk. Nearly one-third of the book is devoted to the topic of grading milk, cream, and butter.

Concerning the Gervais cheese of commerce, G. HEUSER and G. RANFT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 23 (1912), No. 1, pp. 16–19*).—Analyses of 35 samples of Gervais cheese are reported, in which the percentage of fat varied from 5.12 to 38.53, and of water from 41.15 to 69.14.

VETERINARY MEDICINE.

Haubner's veterinary medicine for the agriculturist, edited by O. RÖDER (*Haubner's Landwirtschaftliche Tierheilkunde. Berlin, 1911, 15. rev. ed., pp. XII+782, figs. 170*).—This work is divided into 3 parts: The first deals with internal diseases (pp. 13–459); the second with external diseases (pp. 463–725); and the third with therapeutics (pp. 729–775).

A guide to the dissection of domestic animals, M. SCHMÉY (*Sektionstechnik der Haustiere. Stuttgart, 1911, pp. VIII+224, figs. 58*).—This is a practical guide to the dissection of domestic animals intended for use by veterinarians and students of veterinary medicine.

Common sense treatment of farm animals, C. D. SMEAD (*Pittsburgh, Pa., 1911, pp. 63, figs. 15*).—A popular treatise on the subject.

Practical methods of disinfecting stables, G. W. POPE (*U. S. Dept. Agr., Farmers' Bul. 480, pp. 16, figs. 8*).—This calls attention to the necessity for disinfecting stables, briefly describes the nature of disinfection and the more important disinfectants, and furnishes information regarding their use. A more detailed account by Dorset of disinfecting agents has been previously noted (E. S. R., 20, p. 884).

Annual report of the Bengal Veterinary College and of the Civil Veterinary Department, Bengal, for the year 1910–11, D. QUINLAN (*Ann. Rpt. Bengal Vet. Col. and Civ. Vet. Dept., 1910–11, pp. 5+11+VIII+2*).—The first section includes reports of the epizootic diseases department in Calcutta and its vicinity and of the Raymond Research Laboratory. The second section deals with veterinary instruction, the occurrence and treatment of diseases, breeding operations, etc.

Handbook of serum therapy and serum diagnosis in veterinary medicine, M. KLIMMER and A. WOLFF-EISNER (*Handbuch der Serumtherapie und Serumdiagnostik in der Veterinär-Medizin. Leipsic, 1911, vol. 2, pp. VIII+495, pls. 4, figs. 12*).—This is volume 2 of the handbook on serology which has been previously noted (E. S. R., 23, p. 681), and contains contributions by various experts in their respective lines. Its contents include discussions of protective vaccination against hog cholera and swine plague; immunity against swine plague, hog erysipelas, and anthrax; protective vaccination against blackleg; protective vaccination against and curative treatment for foot-and-mouth disease; treatment against pox in domestic animals; diagnosis of tuberculosis with tuberculin preparations; methods of combating tuberculosis; protective vaccination against tuberculosis; vaccination against calf diseases and infectious abortion; specific prophylaxis and therapeutic measures against streptococcic diseases; serum therapy of fowl cholera; protective and curative treatment against canine distemper; vaccination against bradsot or braxy; protective and curative vaccination against tetanus; vaccination against lung plague in bovines; rinderpest and active immunization against it; mallein as a diagnostic agent for glanders; protective and curative treatment of glanders;

vaccination against rabies; immunizing against African horse sickness; vaccine therapy; pyocyanase; agglutination, precipitation, and complement fixation; anaphylaxis; destruction of mice and rats with bacteria; and a survey of the commercial sera, diagnostic sera, bacterial products, and vaccines for veterinary medical purposes.

Immune sera, C. F. BOLDUAN (*New York and London, 1911, 4. ed., rev. and enl., pp. XI+226, figs. 10*).—This is the fourth edition of this work (E. S. R., 20, p. 1080) which has been entirely rewritten, and enlarged and brought up to date. The book, while it presents Ehrlich's views at length, shows wherein and why this investigator differs from others.

Its chapters contain discussions of antitoxins, agglutinins, bacteriolysins and hemolysins, precipitins, cytotoxins, opsinins, snake venoms and their antisera, anaphylaxis, infection and immunity, bacterial vaccines, leucocyte extracts in the treatment of infections, and principles underlying treatment of syphilis with Salvarsan. Appendixes present (a) the Wassermann test for syphilis, (b) Noguchi's modified Wassermann reaction, (c) blood examination preparatory to transfusion, and (d) the conglutination reaction, the Much-Holzmann cobra venom reaction, the meiostagmin reaction, Weil's cobra venom test in syphilis, and antitrypsin determinations.

Immune bodies and biological reactions, A. EICHHORN (*Amer. Jour. Vet. Med., 6 (1911), No. 11, pp. 803–817*).—A clear, concise discussion of this subject, with particular regard to veterinary medicine.

On the local production of antibodies, L. HEKTOEN (*Jour. Infect. Diseases, 9 (1911), No. 2, pp. 103–114, fig. 1*).—"The results obtained from the experiments recorded in this article do not point to any local production of specific antibodies in dogs injected with goat or rat corpuscles, at least not so far as concerns the tissues about the anterior chamber of the eye, the tissues of the pleura, and the subcutaneous tissues."

Visible detection of antigens; antibody fixation in vitro; the epiphanin reaction, W. WEICHARDT (*München. Med. Wchnschr., 58 (1911), No. 31, pp. 1662, 1663*).—A polemic in regard to the epiphanin and meiostagmin reactions.

Further studies of antistreptococcus serum, G. H. WEAVER and RUTH TUNNICLIFF (*Jour. Infect. Diseases, 9 (1911), No. 2, pp. 130–146*).—"Antistreptococcus serums rapidly lose their opsonic power, which may for some time be largely restored by the addition of fresh human or guinea-pig serum.

"Guinea pigs may be protected against virulent cultures of streptococci by previous injection of antistreptococcus serums. The protective power of immune serums continues so long as they can be reactivated by fresh serum. Injections of immune serums in guinea pigs may be followed by increased activity of leucocytes of short duration and by an increased opsonic power for streptococci in the blood serum persisting for about 10 days. The immunity in guinea pigs produced by injection of immune serum persists for about 8 days.

"Of 3 fresh commercial serums manufactured in the United States which were tested 2 were active and 1 inactive. The 2 European serums were active. Fresh normal human serum and fresh human serum from persons infected with streptococci are able to reactivate antistreptococcus serums. This indicates that such serums may have some protective and curative effect in man in cases of streptococcus infections.

"The specific antistreptococcus bodies are resistant to heat and chemicals (tricresol, 0.4 per cent chloroform) and are closely associated with the pseudoglobulins of the immune serum. It would be desirable to have some guaranty of the activity of antistreptococcus serums offered for sale."

Bacterins as an aid in wound healing, C. H. JEWELL (*Amer. Vet. Rev., 40 (1911), No. 1, pp. 14–25*).—According to this author, one-half the time usually necessary, and the labor, expense of drugs, and dressings required for infected wounds may be saved by treating all such wounds with bacterins. In chronic suppurative conditions bacterins will bring about healing where all other methods have failed.

A description of 14 cases treated by the bacterin method is given in detail.

A new cell proliferant: Its clinical application in the treatment of ulcers, C. J. MACALISTER (*Brit. Med. Jour., 1912, No. 2662, pp. 10–12*).—Analyses have shown that the common comfrey (*Symphytum officinale*) is rich in allantoin, which has been discovered to be a potent cell proliferant.

The new cell proliferant: A note on the Symphytum officinale or common comfrey, W. BRAMWELL (*Brit. Med. Jour., 1912, No. 2662, pp. 12, 13, fig. 1*).—The author reports that on more than one occasion he has cured old ulcers, which have resisted other treatment, by the simple extract from the root of *S. officinale*, applied on lint.

The rôle of antithrombin and thromboplastin (thromboplastic substance) in the coagulation of blood, W. H. HOWELL (*Amer. Jour. Physiol., 29 (1911), No. 2, pp. 187–209*).—The following summary is drawn from the investigations reported:

"By the use of solutions of pure fibrinogen and thrombin it is shown that an antithrombin is present in normal mammalian plasma, as well as in bird's plasma and in the so-called peptone plasma. Tissue extracts contain a substance (thromboplastin) which neutralizes the effect exerted by antithrombin upon the reaction between fibrinogen and thrombin. On the basis of the foregoing results the following hypothesis is suggested to explain the normal coagulation of blood. Circulating blood contains normally all the necessary fibrin factors, namely, fibrinogen, prothrombin, and calcium. These substances are prevented from reacting, and the normal fluidity of the blood is maintained, by the fact that antithrombin is also present, and this substance prevents the calcium from activating the prothrombin to thrombin. In shed blood the restraining effect of the antithrombin is neutralized by the action of a substance (thromboplastin) furnished by the tissue elements. In the mammalia the thromboplastin is derived, in the first place, from the elements of the blood itself (blood platelets). In the lower vertebrates the supply of this material, in normal clotting, comes from the external tissues."

Newer therapeutic agents, P. A. FISH (*Amer. Vet. Rev., 40 (1911), No. 1, pp. 26–34*).—A discussion in regard to the nature, use, and value of acetone-alcohol, acidum nucleinicum, afermol, bacterins or bacterial vaccines, basedowsan, camphora, chromii sulphas, cocainæ hydrochloridum, cupri sulphas, echinacea augustifolia, fibrolysin, formaldehyde, gallogen, hordenin sulphate, horsine, iodipin, perhydrol, radium, serum leucocygenic, and yohimbine.

In regard to the treatment of parturient paresis with adrenalin and suprarenin, R. METZGER (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 16, p. 285*).—The animals recovered much quicker when 5 cc. of a 1:1,000 solution of adrenalin or suprarenin hydrochlorid (synthetic) was injected subcutaneously than when given the usual air-infusion treatment.

Detection of colchicine, H. FÜHNER (*Arch. Expt. Path. u. Pharmakol., 63 (1910), No. 5–6, pp. 357–373; abs. in Chem. Zentbl., 1910, II, No. 25, p. 1838; Analyst, 36 (1911), No. 419, pp. 73, 74*).—The author could isolate colchicin from animals poisoned by this substance by extracting the stomach and intestinal contents and excreta with ether, extracting the residue thus obtained (after evaporating off the ether) with water, removing the fat with petroleum ether, and

finally extracting the colchicin from the aqueous-solution residue with chloroform. The chloroform residue may be hydrolyzed with hydrochloric acid and tested with ferric chlorid, which gives a blue coloration, or it may be tested as regards toxicity by injection into white mice.

Lysol poisoning in various domestic animals, B. PÖTTING (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 16, p. 286*).—In most of the instances where symptoms of poisoning could be noted this antiseptic had been applied externally. The pig was the most sensitive. No cases were noted in bovines.

Upon the proteolytic bacteria and the intestinal flora of man and animals, A. DISTASO (*Centbl. Bakt. [etc.], 1. Abt., Orig., 59 (1911), No. 2, pp. 97–103, figs. 9*).—A description of the following organisms and a discussion in regard to their relation to man, animals, nutrition, cheese, milk, and putrefaction: *Bacillus putrificus coagulans* n. sp., *B. putrificus filamentosus* n. sp., *B. sporogenes zoogleicus* n. sp., *B. sporogenes saccharolyticus* n. sp., *B. sporogenes regularis* n. sp., *B. multiformis* n. sp., *B. tenuis spatuliformis* n. sp., *Staphylococcus liquefaciens aurantiacus* n. sp., *Coccobacillus liquefaciens* n. sp., *B. rigidus* n. sp.

Research in regard to infectious diseases at the present time, P. FROSCH (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 21, pp. 373–377*).—This is a detailed lecture upon the present status of research in infectious diseases, delivered at the Royal Veterinary High School of Berlin.

Infective methæmoglobinæmia in rats caused by Gaertner's bacillus, A. E. BOYCOTT (*Jour. Hyg. [Cambridge], 11 (1911), No. 4, pp. 443–472, figs. 3*).—"A spontaneous epidemic of Gaertner infection among rats was found associated with methæmoglobinæmia and, in some cases, anæmia. Strains of Gaertner's bacillus isolated from these rats reproduced methæmoglobinæmia in fresh rats but not in rabbits, guinea pigs, or mice. Other strains of Gaertner's bacillus from rats, guinea pigs, and human sources also caused methæmoglobinæmia either before or after passage through rats. Other organisms pathogenic for rats did not produce methæmoglobinæmia."

Is paroxysmal hemoglobinemia an infectious disease? C. CUNY (*Jour. Méd. Vét. et Zootech., 61 (1910), Mar., pp. 129–139; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 30, p. 540*).—The author does not believe that this is a bacterial disease. Cold seems to be one of the chief etiological factors. In the cases observed by him fever was never present before the hemoglobinemia proper set in.

Bush disease, B. C. ASTON (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 5, pp. 394–399, figs. 3*).—The evidence obtained during a period of over 14 years is said to show that the condition of live stock, known locally as "bush disease" or "bush sickness," which occurs in the Rotorua, Matamata, and Tauranga Counties, is a condition resulting either from a food supply wanting or deficient in some essential nutrient, which therefore results practically in starvation, or a food supply containing naturally or adventitiously (1) some toxic compound, or (2) some normal constituent present in abnormal quantity, resulting in chronic poisoning.

The spirochetes of gangrene of the lungs and ulcerating carcinoma, G. ARNHEIM (*Centbl. Bakt. [etc.], 1. Abt., Orig., 59 (1911), No. 1, pp. 20–34, pls. 2*).—The spirochetes which occur in the carcinomas in man and animals represent a species of sui generis. The colonies can not be distinguished from one another. No proof as regards the etiological relations of spirochetes to carcinoma has thus far been established, but according to the author it seems peculiar that they are often present in carcinoma. The spirochetes which are usually present in gangrene of the lung were found to be identical with those usually found in the buccal cavity (*Spirochæta dentium*).

Wassermann's method in the diagnosis of dourine, T. PAVLOSEVICI (*Arhiva Vet., 7 (1910), No. 2, pp. 69–82; abs. in Jour. Trop. Vet. Sci., 6 (1911), No. 2, pp. 203–205*).—The author concludes that "antibodies demonstrable by Wassermann's method are formed in the serum of animals suffering from acute forms of trypanosomiasis. These antibodies are not specific either for races or for the genus. The serum of such animals does not show Landsteiner's phenomenon."

The author was unable to demonstrate antibodies in dourine by Wassermann's method by the use of the antigens he employed.

Foot-and-mouth disease in sucklings, D. GERÖ (*Állatorvosi Lapok, 34 (1911), No. 16, pp. 185–187; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 34, p. 612*).—Death was found to be most frequent with 2 to 3-weeks-old animals. On section some animals were found to have an acute gastro-intestinal catarrh and parenchymatous and waxy degeneration of the heart muscle. In many instances, however, the autopsical findings were negative.

After these observations were made the milk was boiled before feeding, as a result of which the mortality has been reduced considerably.

The meiostagmin reaction in foot-and-mouth disease, A. ASCOLI (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 4–5, pp. 308–321*).—As a result of his work the author believes that this reaction will eventually be of value for detecting carriers of the virus of foot-and-mouth disease. The meiostagmin reaction can also be employed for diagnosing tuberculosis and glanders (E. S. R., 24, pp. 779, 780).

The laboratory diagnosis of glanders, B. L. ARMS (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 11, pp. 839–846*).—A discussion of the procedures and value of the various methods proposed for the laboratory diagnosis of glanders, with particular reference to the complement fixation method.

The eye test in glanders, SCHNÜRER (*Deut. Tierärztl. Wchnschr., 18 (1910), No. 5, pp. 65–69; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 6, p. 7*).—A critical discussion in regard to the work of various authors with the opthalmo reaction. According to this author the method is a good one, and the unsatisfactory results obtained with it by various workers are probably due to the use of nonuniform mallein preparations.

Vaccinating against rabies by a dilute virus, T. OSHIDA (*Abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 13–14, p. 323*).—Fresh "virus fixe" is diluted 100, 200, 400, 800, 1,600, 3,200, and 6,400-fold, so as to produce emulsions which finally contain from 0.3 to 0.5 per cent of carbolic acid. For the initial vaccination 1 cc. of the 6,400-fold dilution is given, and for the second, the 1–3,200. Treatment is continued until each dilution has been given. After this the whole cycle is repeated. The results with 80 cases were good.

The resistance of tubercle bacilli to dry heat, C. KRUMWIEDE, Jr. (*Jour. Infect. Diseases, 9 (1911), No. 2, pp. 115–116*).—The material employed in this work consisted of 8 three-weeks-old cultures of the human type of bacillus isolated on glycerinated egg media. The results show that air-dried tubercle bacilli are more resistant to dry heat than bacilli heated in fluids or steam.

The reaction curve in glycerin broth as an aid in differentiating the bovine from the human type of tubercle bacillus, M. GRUND (*Jour. Med. Research, 25 (1911), No. 2, pp. 335–357, fig. 1*).—A large number of strains isolated from 478 unselected cases in man and some in cattle were tested with this method. In most instances tests were begun only after the various strains had been cultivated on artificial media for some time. The final reaction recorded represents the average of 3 flasks, except in a few instances where extensive

evaporation, poor growth, or contamination took place, making some elimination of flasks necessary.

"Broadly speaking, the reaction curve in glycerin broth divides tubercle bacilli into 2 types. The bacilli which possess a low degree of virulence for rabbits and the power to grow well on glycerin media in the early generations produce one type of reaction curve, while those which are virulent for rabbits and which in the early generations grow slowly and with difficulty on glycerin media form the other type of curve in glycerin broth. These 2 types of glycerin reaction curve are again divisible into groups according to their final reactions.

"The curves of adjacent groups show much the same general direction and there is a gradation from one group to the next; but the reaction curves of the groups at both extremes are widely divergent. When any large number of viruses is examined there will be found a small percentage of cases, which, by cultural characteristics and virulence, belong to one type of tubercle bacilli while they would be classed with the opposite type of bacilli if judged by their glycerin reaction curve alone. On repeated tests this reversed glycerin reaction curve may, or may not, be a constant feature of these particular viruses, although the conditions under which they have been cultivated are apparently the same in the several tests. Undetected variations of the culture medium must be taken into consideration; it is not advisable to depend on the reaction curve obtained from one lot of broth only, but several examinations of a virus are desirable. In from 30 to 40 per cent of the viruses retested, the reaction curves belong to different groups, that is, the end reaction may be high in one test, and low or medium in the next. In only 3 instances was the variation so great as to justify the classification of the reaction curves into different types. In about half the cases the degree of acidity produced has been in direct ratio to the amount of growth.

"There is also no constant relation between irregularities of culture and virulence on the one hand, and irregularity of the glycerin reaction curve on the other. Some viruses which culturally and in virulence showed nothing unusual have given very atypical curves, while perfectly normal reaction curves were produced by viruses which from cultural and virulence tests could not be called quite typical.

"The glycerin reaction curve is undoubtedly a valuable corroborative evidence of a division of tubercle bacilli into 2 types. Its value is lessened, however, by the number of irregular and atypical reactions encountered, while as a practical aid in determining the type of an individual virus, it is also much handicapped by the length of time required to carry it out."

Report in regard to avian tuberculosis in mammals, D. A. De Jong (*Ann. Inst. Pasteur, 24 (1910), No. 11, pp. 895–906*).—According to this author avian tubercle bacilli can spontaneously infect, in addition to man, the ape, pig, bovine, rabbit, rat, and white mouse. He assumes that such cases will be observed much oftener as soon as it can be proved that the mammalian tubercle bacillus can be converted by simple mutation into the avian type of bacillus.

The tuberculin test and its limitations, E. G. Hastings (*Hoard's Dairyman, 42 (1912), No. 50, pp. 1525, 1537–1540*).—This article points out the fact that the tuberculin test has certain limitations which must be taken into consideration by those using and interpreting the test.

The intracutaneous test for detecting tuberculosis in bovines, M. Christiansen (*Maanedskr. Dyrlæger, 22 (1910), No. 16, pp. 337–352, figs. 4; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 28, pp. 509, 510*).—Out of 75 animals, 30 gave a positive reaction with this test, and on slaughter 27 of the 30 animals were found to be tuberculous. The author recommends a further critical study of the test.

The ophthalmo reaction with phymatin, W. ASSMANN (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 16, pp. 287, 288*).—Of 210 animals 145 gave a positive reaction with phymatin. The results were confirmed by autopsy on all the animals examined.

Vaccination against tuberculosis in bovines, W. EBELING (*Med. Krit. Bl. Hamburg, 1 (1910), No. 2, pp. 81–89; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 15–16, p. 489*).—This is a summary of the author's report to the Ninth International Veterinary Congress held at The Hague during 1909.

Morphological and experimental studies of a new trypanosome found in cattle in Uruguay, O. PETER (*Arch. Schiffs u. Tropen Hyg., 14 (1910), Beihefte 6, pp. 40, pl. 1; abs. in Bul. Inst. Pasteur, 8 (1910), No. 21, pp. 951, 952; Sleeping Sickness Bur. [London] Bul., 2 (1910), No. 22, pp. 411, 412*).—During the course of investigations conducted in Uruguay in which the blood of a large number of cattle was examined, the author found a trypanosome which has all the characteristics of the *Trypanosoma theileri* group. Its pathogenic properties have not as yet been sufficiently investigated, but that the trypanosome possesses such is shown by inflammation observed in the spleen, liver, and lymph-glands.

The incubation period in artificial infection varies from 9 to 16 days. The trypanosomes can be demonstrated in the blood from 10 to 12 days and are always present in small numbers only. The blood remains infective for at least 11 months.

The trypanosome can be transmitted with certainty to cattle, less easily to calves; it can not be transmitted to horses, dogs, sheep, goats, rabbits, wild rats, guinea pigs, and white mice. The manner of transmission in nature is at present unknown.

The area of distribution includes the Republic of Uruguay and the adjoining Provinces of Argentina and Brazil. As the 7 cattle in which the infection was found came from different sections, the author believes it to be widespread.

The disease was detected in each instance in the slaughterhouse, the presence of a splenic tumor leading to the examination of the blood and spleen pulp. In 2 instances piroplasmata were found as well as trypanosomes, the latter always being very scarce.

A bibliography of 36 titles is appended.

Further investigations into anaplasmosis of South African cattle, A. THEILER (*Rpt. Dir. Vet. Research, Union So. Africa, 1 (1911), pp. 7–46, pls. 7*).—This paper consists of 4 parts entitled, respectively, The Separation of Anaplasmosis from Babesiosis (pp. 8–20); To Test the Immunity Conferred by *Anaplasma marginale* (var. *centrale*) against *Anaplasma marginale* Proper (pp. 20–25); The Transmission of Anaplasmosis by Ticks (pp. 26–32); and The Inoculation of *Anaplasma marginale* (var. *centrale*) as a Means of Protecting Cattle against Anaplasmosis (pp. 33–45). The following conclusions have been drawn by the author from the investigations reported:

"The transmission of *Anaplasma marginale* is only possible with blood containing red corpuscles. Filtrated blood failed to produce the disease when inoculated, the injected animals not showing any lesions at all and proving susceptible to subsequent blood inoculation (heifer 1211). The incubation period after the injection of blood containing anaplasms varies in length and depends on the quantity of blood injected, being shorter after an injection of a large quantity of blood and after the anaplasms have passed through a number of animals.

"Distinction has to be made between varieties of anaplasms. In this article one variety has been distinguished as *A. marginale* and the other as *A. marginale centrale*. The distinction is based (1) on the different position the 2

parasites take up within the red corpuscle; (2) on the difference in size, there being slightly smaller individuals in the *centrale* variety; (3) on the different virulency, the *centrale* variety having caused neither death nor any serious lesions; (4) on the fact that a recovery from an infection from *A. centrale* does not cause complete immunity.

"Anaplasmosis was transmitted in 4 instances by means of *Boophilus decoloratus* larvæ, and once by *Rhipicephalus simus* larvæ, the mothers of which ticks were collected off immune animals. The incubation times after tick infection varied from between a few days under 2 months to a few days over 3 months. It has been noticed in one case (heifer 935) that when a very heavy infestation of ticks is made, an animal may die as a result of loss of blood due to the repletion of the engorged females.

"The *A. centrale* infection, transmitted either by ticks or by inoculation, in no instance caused the death of any of the 39 English heifers. Accordingly, an inoculation with *A. marginale centrale* can be made use of as a practical method of inoculation against anaplasmosis. Recovery from *A. centrale* infection gives so much protection that a subsequent inoculation of *A. marginale* no longer causes death or any serious lesions.

"Animals which were immune to *Babesia bigemina* could easily be infected with anaplasmosis, either by means of ticks or by injection of blood. Animals which were immune to anaplasma infection could easily be infected with *Babesia bigemina*, either by means of ticks or by blood inoculation. Injected animals can be exposed to natural infection before the *A. centrale* reaction has run its course. The anaplasmosis infection due to ticks having a long incubation time (55 to 100 days) will not develop severely in the inoculated animal, in which the disease runs with a shorter incubation time (16 to 40 days). All animals which have passed through an attack of anaplasmosis and redwater conveyed by inoculation and exposed to natural infection for over a year are still alive.

"The anaplasmosis transmitted by ticks was that of the type *centrale* and *marginale*. To judge by the blood smears obtained from the cattle exposed in the veld, a double infection is frequently met with. Animals immune to *Anaplasma* and *Babesia bigemina* infections could easily be infected with *B. mutans*. As an accidental occurrence in some instances the larval ticks of Boophilus, collected off immune cattle, transmitted an infection of *Spirochæta theileri* in typical time. In one instance the inoculation with blood of a horse in which the spirochetes were noted, the pure infection was transmitted to a susceptible animal.

"For the requirements of the conditions of South Africa, it is necessary to combine the immunization against anaplasmosis with an inoculation against redwater. The redwater inoculation can be done before or after the anaplasmosis inoculation, but it is practical to do both at the same time. The redwater having a shorter incubation time will develop first and a recovery will usually be effected before the anaplasmosis reaction sets in. In applying this method to the practice, it is necessary to keep the animal during the redwater reaction (about 15 days) under close observation and to check any unusual reaction by means of a trypanblue injection, and while the animal is undergoing the anaplasmosis reaction it will have to be well fed."

Contributions to the diagnosis of infectious abortion in bovines, Z. Brüll (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 40, pp. 721–727*).—The serum obtained from sound animals showed agglutinations in a titer of 1:32, while animals which habitually aborted agglutinated the *Bacillus abortus* with few exceptions in titers varying from 1:120 to 1:1,600. The agglutination test is, therefore, deemed a valuable diagnostic aid for this condition.

Some further tests in regard to the use of Abortin as a diagnostic agent resulted unfavorably.

The pathogenic action of the Bacillus abortus (Bang), T. SMITH and M FABYAN (*Centbl. Bakt. [etc.], 1. Abt., Orig., 61 (1912), No. 7, pp. 549–555*).—The *B. abortus* (Bang) is considered in all probability the only incitor of infectious abortion in the animals of this country. This organism when inoculated into guinea pigs was found to produce a generalized vaccine disease which was seldom lethal. The disease simulated tuberculosis, and was characterized by chronic interstitial new formations which to the greater extent consisted of epitheloid and lymphoid cells. The *B. abortus* was found to occur in milk.

The relation of the disease to man is also discussed.

A contribution to the study of bovine hematuria, ROGER (*Rev. Vét. [Toulouse], 36 (1911), Nos. 9, pp. 525–532; 10, pp. 593–601; 11, pp. 660–669; 12, pp. 724–735, figs. 4*).—A discussion of bovine hematuria, its etiology, symptomatology, diagnosis, pathological anatomy, pathogenesis, prognosis, and treatment. Original investigations are reported.

An experiment to test the toxic properties of ergot towards cattle, and, in particular, the production of gangrene of the feet by its ingestion (so-called "ergotism"), C. J. REAKES and H. A. REID (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 5, pp. 361–363*).—In the experiment here reported 2 young cattle, a steer aged 18 months, and a yearling bull, were used.

Commencing on June 29, 1911, each animal received 4 cc. (about 1 dr.) of the liquid extract of ergot (B. P.) mixed with half a pint of water, daily. The dose was doubled on July 7 and on July 18 increased to 16 cc. for the bull and on July 24 for the steer. On August 8, the steer had lost condition slightly, but this is thought to have been the result of bad weather and scarcity of grass feed. The condition of the bull was very good, so that in his case the dose was further increased on August 16 to 30 cc., and finally, on September 9 to 40 cc. daily. The maximum daily dose for the steer remained at 16 cc. These quantities of the liquid extract of ergot were given every day (with the exception of 3 days from August 8) until September 26, when it was decided to discontinue the dosage. Altogether the bull calf received 65 oz., or 3½ pints of liquid extract of ergot, extending over a period of 89 days, while the steer received 2 pints. The climatic conditions prevailing at the time were not favorable to the resistant powers of the animals, the weather for the most part being cold and often very wet.

At no period of the experiment was any lameness apparent, nor were any signs of disease of the extremities shown.

Acorn poisoning in cattle, W. T. BROOKES (*Vet. Jour., 68 (1912), No. 440, pp. 88–90*).—A brief report is given of cases of poisoning in several lots of cattle in different districts that resulted from the consumption of acorns.

Investigations in regard to five anaerobes found in calves which came to slaughter, A. LELLEK (*Untersuchungen über Fünf im Fleische Notgeschlachteter Tiere Gefundene Anaerobier. Inaug. Diss., Univ. Bern, 1910, pp. 44, fig. 1*).—A description of 5 organisms which were isolated from calves.

Four of the organisms (bacilli) were culturally, biologically, biochemically, and morphologically similar. All of the bacteria were pathogenic for a variety of animals. The organisms were not positively identified, but the Gohn-Sachs bacillus, *B. botulinus*, *B. tetani*, *B. œdematis*, *B. mucosus*, *B. carnis*, Hibler's anaerobe Nos. 9 and 15, *B. saccharobutyricus*, *B. bovis morbificans*, *B. enteritidis sporogenes*, Novy's bacillus, *B. phlegmones emphysematosæ*, *B. anthracis symptomaticus*, *B. putrificus*, and *B. cadaveris sporogenes* could be excluded.

Sepsis in calves caused by the Diplococcus (Streptococcus) lanceolatus, F. BALZER (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 8, pp. 249–252*).—Com-

menting on Krautstrunk's work (E. S. R., 23, p. 485) the author states that he has isolated an organism from 4 calves which came to slaughter on account of having septicemia. After giving the complete patho-anatomical findings with one animal and the results of a bacteriological examination of the remainder, he points out that the Diplococcus isolated from these calves behaved culturally and serologically like the *D.* (*lanceolatus*) *pneumoniæ* (Fränkel), which is the cause of pneumonia in man.

The dipping of sheep for scabies in tobacco dips with and without the addition of flowers of sulphur, E. S. Good and T. R. Bryant (*Kentucky Sta. Bul. 157, pp. 183–193, pls. 2*).—This is a report of experiments conducted in cooperation with the Bureau of Animal Industry of this Department for the purpose of determining whether or not it is necessary to use sulphur with tobacco dips in the dipping of scabby sheep in order to effect a cure.

In carrying out the experiment 6 groups of equal size were dipped twice for periods of 2 minutes, 10 days intervening between the dips. The experiment was conducted with tobacco extract containing as high as 0.07 per cent nicotin, both with and without 2 per cent of sulphur, added at the second dipping.

The conclusions drawn are that with the conditions under which the experiment was carried on, as here described, the addition of flowers of sulphur in the prescribed solutions of nicotin did not, so far as could be discerned, enhance the value of these dips in curing sheep of scabies. It is stated that dipping experiments since conducted by the Bureau of Animal Industry on western ranges under field conditions, confirm the conclusions drawn from the experiments here reported and that as a result the requirement that sulphur be added to tobacco dips was withdrawn on May 1, 1911.

Cæsarian section for hogs, A. P. L. Jensen (*Maanedskr. Dyrlæger, 22 (1911), No. 19, pp. 433–435; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 17, p. 308*).—A description of the technique in the operation.

Hog cholera and swine production (*Live Stock Com. N. J. Circ. 1, 1912, pp. 21*).—This circular deals clearly and concisely with the prevalence of hog cholera, its nature and symptoms, the management of cholera herds, inoculation with hog-cholera serum, prevention of diseases, use of disinfectants, and details of hog raising in New Jersey, such as the choice of breed, care of the young pigs, rations for market pigs, feeding garbage, the housing and management of the herd, and the care of breeding stock.

Tests with extracts of Bacillus erysipelatis suis, Block (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 21, p. 377*).—As a result of vaccinating 120 hogs against erysipelas with extracts of the bacilli and serum the author points out that the method is better than that which employs virulent cultures of the bacillus.

"Porcidin:" A new remedy against swine plague, A. Grabe (*Deut. Tierärztl. Wchnschr., 18 (1910), No. 21, pp. 311, 312; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 2 (1910), No. 13–14, p. 324*).—A discussion in regard to the results obtained with this serum preparation. As they were somewhat indefinite, the author states that more work will have to be done with it in order to prove its efficiency.

Contribution to the etiology of the pectoral form of equine influenza, W. Pfeiler (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 2–3, pp. 155–210*).—By intravenously inoculating 120 cc. of a bouillon culture of Schütz's streptococcus into a horse a condition was produced which simulated the pectoral form of equine influenza. Serologic tests indicated that the *Pasteurella equina* (Lignières) has no significance in this disease. The author concludes that as there is no definite proof that any organism other than

Schütz's streptococcus is the etiological factor this organism must for the present be presumed to be the cause of equine influenza.

Hemoglobinuria of horses and its treatment, DROUIN (*Rev. Gén. Méd. Vét., 17 (1911), No. 200, pp. 449–468; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 38, pp. 693, 694*).—A detailed statement of the treatment for this condition, no specific form of treatment being recommended.

Carbon bisulphid for ascarids in the horse, D. GROAG (*Állatorvosi Lapok, 33 (1910), No. 15, p. 172; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 16, p. 292*).—After placing gelatin or keratin capsules containing the carbon bisulphid upon the tongue of the horse an assistant pours water from a bottle into the mouth of the animal. In about 36 hours the ascarids are expelled. The author, however, recommends giving evacuants, such as aloes and castor oil. In order to be certain that the ascarids are expelled, 10 gm. of carbon bisulphid is given in the same manner some weeks latter.

The viability of parasitic ova in two per cent formalin, with especial reference to Ascaris lumbricoides, R. S. MORRIS (*Bul. Johns Hopkins Hosp., 22 (1911), No. 246, pp. 299, 300*).—The author has found that the ova of *A. lumbricoides* may remain viable in a 2 per cent solution of formalin for an indefinite period. In the observations reported the embryos were still motile 29 months after they were first observed to be alive. A few embryos which had escaped from the shell were observed, but in all instances they were dead.

Spirochetes and hemorrhagic gastro-intestinal infections of the dog, V. BALL and ROQUET (*Jour. Méd. Vét. et Zootech., 62 (1911), May, pp. 257–260, fig. 1; abs. Vet. Rec., 24 (1911), No. 1217, pp. 279, 280*).—The spirochete concerned, which has previously been reported by Regaud[a] as commonly present in the normal gastric mucous membrane of the dog and cat, is described as *Spirochæta regaudi*. The authors' investigations of the dog indicate that this organism is not the cause of hemorrhagic gastro-enteritis. The spirochetes were commonly found in the mucous membrane and are as frequent in normal stomachs as in those showing inflammatory and hemorrhagic lesions.

A microfilaria from the domestic fowl, BERKÉ (*Centbl. Bakt. [etc.], 1. Abt., Orig., 58 (1911), No. 4, pp. 326–330, pl. 1; abs. in Jour. Roy. Micros. Soc., 1911, No. 5, p. 625*).—The author describes a microfilaria that was found to be very abundant in the liver of a domestic fowl in Kamerun.

Coccidiosis in British game birds and poultry, H. B. FANTHAM (*Jour. Econ. Biol., 6 (1911), No. 3, pp. 75–96, figs. 2*).—This paper deals with the occurrence of *Eimeria avium* in the host, the symptoms of coccidiosis in birds, the life history of *E. avium*, as previously noted (E. S. R., 24, p. 684), notes on the condition of the internal organs of infected birds, the dissemination of coccidiosis, duration of vitality of coccidian oöcysts, some preventive measures and suggestions for treatment, and some other coccidia and their hosts.

Blackhead.—Infectious entero-hepatitis or typhlo-hepatitis.—A disease of young turkeys, W. JOWETT (*Jour. Compar. Path. and Ther., 24 (1911), No. 4, pp. 289–302, figs. 14*).—This paper, which records the occurrence of this disease in Cape Town and the Western Province, has been previously noted from another source (E. S. R., 26, p. 384).

RURAL ENGINEERING.

Engineering for land drainage, C. G. ELLIOTT (*New York, 1912, 2. ed., pp. XVI+339, figs. 60*).—This edition represents an entire rewriting of this work on the basis of additional data which has become available since the prepara-

[a] Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 5, pp. 229–231.

tion of the first edition (E. S. R., 14, p. 926). The author states that it "embodies the essential features of drainage engineering in this country at the present time, with the latest developments along each line, and is adapted to the use of the professional engineer and the student."

The chapter headings of the book are as follows: Development of land drainage, the drainage engineer, engineering technique, drainage and how accomplished, the preliminary survey, underdrains and their location, flow in underdrains, the run-off from underdrained areas, size of tile-drains, selection of drain-tile, construction of tile-drains, flow in open channels, the run-off from large areas, location and construction of open ditches, problems in open-ditch work, drainage districts, levee drainage systems, reclamation of tidal lands, drainage of irrigated lands, drainage of peat and muck lands, control of hill waters, drainage of home surroundings, and estimates and accounts. A large amount of available data is summarized, including formulas and tabular data for use in various phases of the work.

Land drainage by means of pumps, S. M. Woodward (*U. S. Dept. Agr., Office Expt. Stas. Bul. 243, pp. 44, pls. 5, figs. 3*).—This bulletin discusses the conditions under which land drainage by means of pumps is feasible, cites successful examples in Europe and this country, and describes in detail operations in the Upper Mississippi Valley.

"The reclamation for agricultural purposes of river bottom lands lying so low that they are subject to serious injury by overflow has been proved by experience in Europe and in this country to be feasible and profitable when carried out by means of a system of protective levees supplemented by interior drainage ditches and a pumping plant to remove excessive precipitation which may fall within the district.

"Numerous tracts in units of from 5,000 to 20,000 acres have been thus reclaimed along the Illinois River and on both sides of the Mississippi in the States of Illinois, Iowa, and Missouri. In some districts the cost of the general drainage improvements, including levees, ditches, and pumping plant, has been as high as $30 per acre. This method of reclamation may be expected to be extended constantly to new localities as agricultural land becomes more valuable.

"The design and construction of the levees, ditches, and pumping plant require a considerable degree of engineering ability. . . . The levees must originally be made of such height and thickness as to afford ample strength and they must also be given careful subsequent attention to secure proper maintenance. The internal drainage ditches should be deep enough to keep the ground water level at least 3 ft. below the surface and their capacity should be sufficient to discharge heavy rains freely to the pumping station. Streams entering the district from higher ground should be diverted around the levees where such a plan is feasible.

"The pumping plant should have a capacity sufficient to remove as a minimum amount in 24 hours a quantity of water sufficient to cover the entire district to a depth of one-fourth inch. The capacity should be greater in situations of heavy rainfall and where the run-off of rolling land is received in the district.

"The pumping machinery should be so arranged as to reduce to a minimum the work of disposing of the surplus water, and it should be chosen with especial regard to economy and efficiency in operation. Where large fluctuations in the river level are to be expected, the machinery must be sufficiently large to operate at the maximum head, and at the same time must be as efficient as practicable for more moderate heads.

"The operation and supervision of the pumping machinery must be given careful attention with a view to securing the greatest economy in operation and careful preservation through the year. . . . When properly designed and operated, drainage pumping plants prove highly profitable for the reclamation of wet lands in regions where agricultural land is sufficiently valuable."

The cost of installation of a pumping plant is estimated under average conditions as not to exceed $3 per acre, and the cost of maintenance, including interest and depreciation, at 90 cts. per acre per annum.

Report on the Belzoni drainage district in Washington County, Mississippi, H. A. KIPP (*U. S. Dept. Agr., Office Expt. Stas. Bul. 244, pp. 55, figs. 6*).—This bulletin presents a plan of drainage for a tract of 100,000 acres of wet lowlands in the Yazoo Delta, lying in the eastern part of Washington County, Miss. It gives the results of an extensive field survey, supplemented by special investigations of run-off and high-water stages in the vicinity of the district. Plans for its improvement, together with a discussion of the difficulty of complete reclamation, are given, together with an estimate of the probable cost.

According to these plans, 90,158 acres in the entire district will be actually benefited at an average cost, exclusive of interior or detailed drainage, of $2.67+ per acre.

A report upon the Back Swamp and Jacob Swamp drainage district, Robeson County, North Carolina, S. H. MCCRORY and C. W. MENGEL (*U. S. Dept. Agr., Office Expt. Stas. Bul. 246, pp. 77, figs. 7*).—This bulletin embodies the results of an examination made with a view to ascertaining the best methods of reclamation of an area of about 33,000 acres of swamp land in eastern North Carolina. A description of the survey and the method of applying the data obtained therefrom are set forth, together with detailed recommendations for drainage and an estimate in detail of the cost.

"The poor drainage conditions existing in the territory . . . are due to the failure of the natural watercourses within the district to afford efficient outlet, these watercourses being usually broad, flat swamps covered with timber and undergrowth, and having in general little or no well-defined channel in them. . . .

"The main feature of the improvements is the construction of efficient ditches in the principal drainage channels within the district. These ditches are designed with sufficient capacity to take care of all the water that they may reasonably be expected to be called upon to handle, and they are of sufficient depth to act as outlets for future farm drainage in the district. The ditches are to follow in general the natural 'runs' of the swamps. . . .

"The total cost of the recommended improvements, which will make available for cultivation all the land within the district. . . . is estimated at $142,621. This gives a cost per acre of $4.34. Since the expenditure recommended may reasonably be expected to more than double the land values of the district, it would seem that the investment should be an attractive one from this standpoint alone."

Drainage of the wet lands of Effingham County, Ga., F. G. EASON (*U. S. Dept. Agr., Office Expt. Stas. Circ. 113, pp. 24, figs. 3*).—This circular deals with the general drainage conditions of the county and the various elements which enter into the solution of the problem. It is estimated that 12,220 acres will be benefited under the plan proposed, at an average cost per acre of $2.58.

Reclamation by drainage, J. C. FITTERER (*Wyoming Sta. Bul. 90, pp. 3-22, pls. 5, figs. 5*).—A drainage system on the station stock farm, installed in cooperation with the Drainage Investigations of this Office, and its action in re-

ducing alkali in the land are described with a view to supplying information as to methods of reclaiming alkali land.

An area of 80 acres was reclaimed which had been rendered unproductive through water logging because of heavy irrigation and the accumulation of alkali. The installation of a system of tile drainage at a cost of $905, or $11.30 per acre, was followed by a gradual disappearance of alkali, except on knolls not covered, and an increase in productiveness.

The use of explosives in clearing land, J. F. KADONSKY (*Wisconsin Sta. Bul. 216, pp. 3–19, figs. 20*).—Directions are given for the use of explosives in removing stumps from lands and in blasting bowlders.

Mileage and cost of public roads in the United States in 1909, J. E. PENNYPACKER, Jr., and M. O. ELDRIDGE (*U. S. Dept. Agr., Office Pub. Roads Bul. 41, pp. 120*).—This bulletin supplements Bulletin 32, previously noted (E. S. R., 19, p. 486), presenting data to December 31, 1909.

The total mileage of public roads in the United States at the close of 1909 is estimated at 2,199,645.14 miles, of which 102,870.44 miles were surfaced with gravel, 59,237.35 with stone, and 28,372.52 with other materials, or a total of 190,476.32 miles or 8.66 per cent as compared with 7.14 per cent in 1904. The average cost per mile of improved roads is estimated at $723 for sand clay, $2,047 for gravel, $4,989 for macadam, and $10,348 for bituminous construction.

New Hampshire highways, C. H. HOYT (*U. S. Dept. Agr., Office Pub. Roads Bul. 42, pp. 35, pls. 41*).—This embodies a report of an inspection of practically the entire system of about 500 miles of improved highways in New Hampshire, with a discussion of the highway problem in the State.

Among the recommendations for future work are the establishment of a patrol system on state roads, the continuance of state aid to towns both financially and by engineering assistance, the construction of a system of state-aided cross-state roads, the building of native stone macadam in preference to gravel roads, the use of trap rock as a top course underlaid by native rock and with a bituminous binder, the use of the split-log drag on all earth and gravel roads, the replacement of wooden culverts by reinforced concrete construction, and the investigation of grade crossings with a view to their elimination.

Coke-oven tars of the United States, P. HUBBARD (*U. S. Dept. Agr., Office Pub. Roads Circ. 97, pp. 11*).—This circular gives the results of examinations of the various coke-oven tars at present manufactured in this country, together with a brief discussion of their properties in relation to their use as road materials.

The analyses disclosed wide variations in the composition of the coke-oven tars produced in this country, even in tars from the same type of oven. In general, however, the free carbon content and proportion of total distillate to pitch residue are considered well adapted to use as road builders. It is estimated that because of the use in this country of beehive coke ovens, in which the by-products are not recovered, sufficient tar alone is lost each year to build 9,000 miles of tar macadam road 15 ft. wide. The general adoption of by-product ovens is strongly advocated, as it is believed that they will eventually play a most important part in the road material industry.

Practical poultry buildings, H. L. BLANCHARD (*Washington Sta. Bul. 4, spec. ser., pp. 3–36, figs. 17*).—This is a new edition of a bulletin previously noted (E. S. R., 23, p. 691), to which has been added a plan and description of another laying house.

"The Kellerstrass way" of building poultry houses, brooder houses, incubator cellars, coops and appliances, E. KELLERSTRASS (*Kansas City, Mo., 1910, pp. 92, figs. 46*).—Plans and descriptions of poultry houses and various kinds of poultry appliances are presented.

RURAL ECONOMICS.

The logged-off lands of western Washington, H. F. GILES (*Olympia, Wash.: Bur. Statis. and Immigr., 1911, pp. 71, pls. 2, figs. 13*).—This publication was prepared especially for the purpose of giving to prospective settlers and outside inquirers information relative to what has been done, and the possibilities of what may be done, along agricultural lines on the logged-off lands in the western half of the State of Washington.

It is noted that some of the land may be bought as low as $10 per acre. The leading agricultural products are hay, potatoes, oats, etc., the soil and climate being deemed especially adapted to the raising of fruits, nuts, and grain. Dairying promises to be one of the leading industries.

Southern agriculture, plantation system, and the negro problem, L. C. GRAY (*Ann. Amer. Acad. Polit. and Soc. Sci., 40 (1912), No. 129, pp. 90–99*).—This article discusses at length several phases of the economic institutions which relate particularly to southern agriculture and the negro problem, among which are the growth and status of the plantation system, agricultural methods, large *v.* small scale industry, supervision of labor, merits and defects of the different forms of tenancy, sources and effect of credit, labor legislation, and the relation that the negro's social, ethical, educational, and religious life bears to his economic development.

Small holdings, G. SYMONS (*Agr. Students' Gaz., n. ser., 15 (1911), No. 5, pp. 153–156*).—The author discusses the effect and workings of the small holdings act as applied to the district in East England.

As regards those who require a 40 to 50-acre farm, and intend to make their entire living off it, it is stated that the outlook for them is not very hopeful, for, as a rule, they are at considerable distance from the nearest market and station, and have no choice but to grow the same crops as the larger farmers in their neighborhood and thus enter into direct competition with them. "It is very doubtful whether such holdings can be largely increased with any certainly of success," the chief cause of failure being due to the lack of sufficient capital on the part of the average small holder.

It is suggested that the class who require from 2 to 10 acres to work in addition to or in conjunction with other occupations, and who run comparatively little risk, should in most cases be successful. The measure of success of any of the small holders, according to the author's point of view, will depend largely to what extent they amalgamate themselves into cooperative societies, especially cooperative credit societies which will enable a man to borrow money for short periods on reasonable terms.

Small holdings and the small holder, T. SMITH (*Jour. Roy. Hort. Soc. [London], 37 (1911), No. 2, pp. 295–301*).—This paper inquires into the causes of rural depopulation and the circumstances which make a recolonization of the country districts by means of small holdings desirable. It discusses the conditions under which the small holder should work and the qualifications he should possess in order that he may have a reasonable propect of success.

Tenants v. occupying owners, W. BRADWOOD (*Abs. in Field [London], 119 (1912), No. 3082, p. 104*).—This article presents a brief abstract of an address recently delivered by Lord Carrington regarding the small holdings of England. In his opinion "an occupier is better off as tenant than as freeholder, inasmuch as purchase entails a locking up of capital which might otherwise be profitably employed in the business, or at the high prices of land could be invested in securities and yield a tangible margin of surplus after deducting the holding's rent.

The need for long leases, E. E. MILLER (*Country Gent., 77 (1912), No. 5, p. 13*).—In discussing the systems of land renting practiced in the United States the author here emphasizes the economic difference between short- and long-term leases, stating that short-term leases give the tenant little or no incentive to look beyond the crop he is producing. The landlord, on the other hand, not expecting any improvement in his soil often tries to obtain from his tenant the largest possible immediate return, with the result that both become soil robbers and the farm steadily decreases in productiveness. It is suggested that the long-term system would tend to eliminate the slovenly farming methods and short-sighted business dealings common on tenant farms of short-term leases.

Economic significance of changes in country population, T. N. CARVER (*Ann. Amer. Acad. Polit. and Soc. Sci., 40 (1912), No. 129, pp. 21–25*).—In discussing the distinct and noticeable tendency of the old rural population to give way to a new type of population, the author thinks that the economic significance is not so much in the difference in race and language as in that of religion and social position; not so much whether the incoming population is to be a land owning or a tenant population, as whether it is to be, as it has always been, one of a lower standard of living than that which is displaced.

To prevent this displacement of the American standard of living, restricted immigration and a minimum wage law are suggested, but it is noted that this would not stop the farmer with a lower standard from buying or renting the land away from farmers with a higher standard. Another remedy suggested is to educate the people up to a higher standard, but this, it is said, would create international competition, unless, in the increase of the standard, productive efficiency is correspondingly increased.

The author argues that the only way of preventing the displacement of the American standard of living is by its "becoming a rational and efficient standard instead of merely an expensive standard. That is to say, if the increased expenditure of the American farmer's family can be made to yield returns in greater efficiency, greater intelligence, greater mental alertness, more exact scientific knowledge and calculation, then the American farmer will not be displaced by the foreigner. But if the rising cost of living for the American farm family is due to a mere demand for luxury, for expensive vices, and for ostentation, there is no power on earth which will protect his standard of living. Such a farmer is handicapped in competition with the more simple-minded foreigner, and the latter will offer such prices for land as the former will not be able to pay. Being unable to maintain a family on such a standard, this type of American farmer will sacrifice his desire for a family, will have fewer children or none at all, and, in a few generations, will disappear altogether."

Decline of a rural community, A. MARTIN (*Nebr. Farmer, 44 (1912), No. 4, p. 83*).—This article gives concrete illustrations as to how rural depopulation is affecting a Nebraska county by showing that within the past 10 years, since land began to increase in price, 11 families from one neighborhood have moved to town. The effect has been to require a larger contribution from those who remain toward good roads, better schools, etc. The enrollment of the neighborhood school has decreased from 35 to 12, and instead of the schoolhouse being as formerly a social center at small cost, the few people now remaining go to town and pay cash for their entertainment.

Town lads on New Zealand farms, T. E. SEDGWICK (*United Empire [Gt. Brit.], n. ser., 2 (1911), No. 12, pp. 872–875*).—This article presents a concrete illustration of where 50 boys, ranging from 16 to 19 years of age, were drawn from the various occupations and trades in London and Liverpool, taken to New

Zealand, and hired to farmers for wages ranging from 5 to 10 s. a week, in addition to board, lodging, clothes, instruction, etc. One shilling of this wage was given to each boy weekly for pocket money, and the balance banked in the name of the secretary of labor as trustee.

It is reported that the boys made good farm laborers and their wages, in many cases, were more than doubled the second year. The project is looked upon as one which, if developed along proper lines, would not only relieve congested conditions in large cities, but also aid greatly in solving the agricultural labor problem.

Agricultural credit, M. DUFOURMANTELLE, trans. by PAULINE C. BIDDLE (*Philadelphia, 1912, pp. 43*).—This is an English edition of a French publication setting forth the general theory of cooperative credit, the uses to which rural credit may be applied, the guiding principles of the organizations, and the working system of agricultural credit.

Agricultural credit in Mexico, A. G. GRANADOS (*Agr. Mexicano, 10 (1910), No. 10, pp. 21–23; 11 (1911), Nos. 1, pp. 21–24; 2, pp. 18–20; 3, pp. 6–8; 4, pp. 17–19; 5, pp. 20–23; 6, pp. 20–22; 7, pp. 17–19; 8, pp. 17, 18; 9, pp. 17, 18; 10, pp. 17, 18; 11, pp. 4–6; 12, pp. 7–10; 12 (1912), Nos. 1, pp. 13–15; 2, pp. 15, 16*).—This is a series of articles in which are discussed in a general way such questions as agricultural credit; agricultural banks; establishment and increase of farms; land cultivation; exodus of rural population; agricultural syndicates; cooperative rural societies; and methods of solving the professional, industrial, social and economic problems of rural communities.

Why does cooperation succeed in some cases and fail in others? L. S. TENNY (*N. Y. Tribune Farmer, 11 (1912), No. 533, pp. 3, 18, figs. 2*).—This is a paper read before the annual meeting of the New York State Fruit Growers' Association at Rochester, January 4, in which the causes assigned for the success or failure of cooperative organizations are discussed in detail. The underlying requisites of successful cooperation are classified as follows: (1) A common need or at least some common ground between farmers, (2) incorporating the organization, (3) putting in the money for the capital stock on a nonprofit sharing basis, and (4) a signed contract between the central organization and the individuals shipping through it.

Successful mutual company, J. P. THIESSEN (*Nebr. Farmer, 44 (1912), No. 4, p. 99*).—This article describes the working of a mutual fire insurance society in Jefferson County, Nebr., which insures against loss by fire and lightning. The charge for new insurance is 20 cts. per $100 insured, of which 15 cts. goes to the treasury to pay losses. Thirty-five years' experience indicates that it requires about 15 cts. to meet losses.

Mutual insurance, J. R. HUFFMAN (*Nebr. Farmer, 44 (1912), No. 4, p. 95*).—It is here noted that 18 years ago the farmers of Nemaha County, Nebr., organized a mutual insurance company, which now has 226 members with no salaried officers, and nearly $500,000 insurance in force.

Efficient use of farm labor, E. H. THOMPSON (*Cornell Countryman, 9 (1912), No. 4, pp. 110–113, figs. 2*).—This article presents a brief discussion of the possibility of applying scientific management to farm and farm labor, the problem being to keep laborers, horses, etc., efficiently employed throughout the year. It is suggested that this may be best accomplished by diversification, or so planning the rotation of the farm as to have the work on the crops come at separate periods. Charts are given illustrating (1) the distribution of man and horse labor on a farm where small grain was the only crop grown, and (2) the actual cost of man labor per month on an eastern dairy farm.

The business of the small farm, edited by W. BROOMHALL (*Country Gent. Estate Book, 1911, pp. 277–280*).—A discussion as to the business side of farm

life and the importance of farm records, together with simple illustrations of methods for keeping a record of farm income and expenditures.

Bookkeeping for farmers, P. G. GILDER (*Dept. Agr. N. S. Wales, Farmers' Bul. 43, 2. ed., 1911, pp. 20*).—This bulletin presents reasons for keeping farm accounts and suggests methods by which such accounting may be simplified and made practicable.

Cost of living in France, J. E. DUNNING (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 21, pp. 401–404*).—In discussing the cost of living in France as compared with other countries it is noted that despite the high price of food it is still possible for the small French family to live comfortably according to its own standards at a much lower rate than will be paid in the United States for the support of an equal number of individuals. The difference is said not to arise from the fixed charges of life, such as rent, food, clothing, and fuel, but from the tendency of the American family to live up to or beyond its income in supplying itself with comparative luxuries, which the French family of equal station has so far considered beyond its reach. Another source of difference noted is in the character of the people, the average ambition in France being to live comfortably on a comparatively fixed income, whereas in the United States income is regarded as ever subject to increase through effort.

The report notes further, however, that the present increased cost of living, in view of the French law, is not due to combinations in restraint of trade and augmentation of prices, but simply to a demand for better, and therefore more expensive, conditions of living. The remedy as suggested by the French themselves is reduction of the tariff on mutton and pork and an increase of the wage scale or purchasing power of the people.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 14 (1912), No. 1, pp. 8, figs. 10*).—Notes and statistics are given showing the stocks of potatoes January 1, 1912, the proposed scope of crop reports in 1912, value of farm products on dates indicated, range of prices of agricultural products at important markets, wheat supply and distribution by States, exports of farm and forest products from the United States during the years ended June 30, 1910, and June 30, 1911, monthly receipts and stocks of eggs and poultry in the United States, and the quantity of wheat and oats sown per acre by States. There is also a brief summary of Bulletin 85 of the Bureau abstracted on page 532, and charts illustrating the 1911 production of corn, wheat, oats, barley, rye, flax seed, tobacco, and Irish potatoes by States.

[Exports and imports of agricultural products in France] (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 11, pp. 1369–1374*).—Tables are given showing the quantity and value of the principal agricultural products imported and exported by France during the first 6 months of 1909, 1910, and 1911.

AGRICULTURAL EDUCATION.

Report of the committee on instruction in agriculture, 1911 (*U. S. Dept. Agr., Office Expt. Stas. Circ. 115, pp. 19*).—Previously noted (E. S. R., 26, p. 10).

The committee recommends the use of the term "home economics" to designate subjects and departments heretofore variously designated as "domestic science," "home science," and "domestic art," etc.

Training teachers to teach agriculture, C. H. WINKLER (*Farm and Ranch, 31 (1912), No. 4, p. 9*).—The author holds that ignorance among teachers regarding the most elementary facts in agriculture, together with an utter lack of interest in farm life, constitutes one of the chief obstacles to the intro-

duction of agriculture into the public schools. He believes that teachers of agriculture must be well versed in the fundamental principles of both the biological and physical sciences and their relation to the science and art of agriculture. As taught in the high school, agriculture should deal primarily with a study of laws and principles, rather than mere facts. Agricultural subjects must be taught by the nature-study mode, but method is of secondary importance. The teacher's training should begin in the grades, and laboratory work, school gardening, and outdoor study constitute an essential part of such training.

Agriculture in the rural schools, E. C. BISHOP (*Bul. First Dist. Normal School, Mo., 11 (1911), No. 2, pp. 14–19*).—The topics discussed in this paper are (1) The cause of the exodus from country to city and from city to country. (2) what agriculture includes, (3) means of arousing interest in the study of agriculture, (4) what, how much, when, and where shall agriculture be taught in the rural schools, (5) the consolidated school, and (6) special winter courses. The author believes that the work in agriculture in the rural school should begin with the study of those concrete topics which are of most importance to the community, such as corn growing, rotation of crops, dairying, gardening, canning and preserving, sewing, spraying, beautifying the home, etc., and that these subjects should, as they are taken up, form a basis for language work, arithmetic work, geography, orthography, reading, writing, drawing, and economics.

Agriculture in rural schools, II, W. H. FRENCH (*Moderator-Topics, 32 (1912), No. 22, pp. 455–457*).—Besides showing that the agricultural work in the rural school should be adapted to local conditions, and furnishing a list of essential simple apparatus, the author outlines 12 exercises dealing with seeds, cuttings, potato experiments, soil types, soil moisture, and soil cultivation.

A course of study for the preparation of rural school teachers, F. MUTCHLER and W. J. CRAIG (*U. S. Bur. Ed. Bul., 1912, No. 1, pp. 23*).—After indicating the cultural branches which should be studied by rural school teachers, the authors enumerate as necessary for their "proper training, nature study, elementary principles of practical agriculture, sanitary science and hygiene, domestic economy, and practical principles and problems in elementary chemistry and physics as applied in the study of these subjects." These special courses are discussed in detail, accompanied with detailed outlines of the ground to be covered, and the manner in which the several courses should be treated.

The need of specimen or supply cabinets in public schools, H. L. BOLLEY (*Dakota Farmer, 32 (1912), No. 4, pp. 186, 187*).—There is outlined in this article the essential permanent and reasonably permanent equipment for the proper teaching of agriculture in a rural school.

A course in meteorology and physical geography, W. N. ALLEN (*U. S. Dept. Agr., Weather Bur. Bul. 39, pp. 35*).—Most of this course treats of meteorology, to which the other portions are cognate and introductory. The 20 exercises included deal with such subjects as the globe, change of seasons, the atmosphere, wind direction and rainfall, seasonal change in temperature, daily change in pressure, weather maps, and the ocean. Each exercise includes directions for work, questions for a written review, and a list of reference books.

Practical botany, J. Y. BERGEN and O. W. CALDWELL (*Boston, New York, Chicago, and London [1911], pp. VII+545, figs. 388*).—In this text those aspects of plant life are presented which have the largest significance to the public in general, and which are of most interest and educative value to students beginning the subject. It includes the principles of plant nutrition and its relation

to soils and climate and to the food of animals and men; discusses some of the diseases of plants, animals, and men, which are produced by parasitic plants; and gives in an elementary way the propagation of plants, plant breeding, forestry, and the main uses of plants and plant products.

The material in the book is designed for a year's course, but is so arranged that it can be adjusted to a half-year course when desirable. It contains numerous bibliographies and is copiously illustrated.

Planting an orchard, A. J. NORMAN (*Facts for Farmers [Mass. Agr. Col.], 2 (1912), No. 5, pp. 4, figs. 2*).—This pamphlet deals in an elementary way with the preparation of the land, laying out the orchard, etc.

Lessons from the forest, A. W. NOLAN (*W. Va. School Agr., 2 (1911), No. 3, pp. 49–66, figs. 11*).—The author here presents some elementary principles and practical exercises in forestry which may be correlated with work in nature study and elementary agriculture, together with 6 lessons on tree studies, tree societies, the farmers' woodlot, nut crops, and trees in the landscape.

Judging dairy cows, J. A. MCLEAN (*Facts for Farmers [Mass. Agr. Col.], 2 (1911), No. 4, pp. 4*).—A practical discussion.

Course in the use and preparation of vegetable foods for movable and correspondence schools of agriculture, ANNA BARROWS (*U. S. Dept. Agr., Office Expt. Stas. Bul. 245, pp. 98*).—The author has endeavored to reduce the subject of the preparation of vegetable foods to such pedagogical form that the student may be brought to know in a comparatively brief period not only how food of this character should be prepared, but also be taught the relative value of different vegetable foods and the principles which underlie their rational use. Queries, experiments, and practice work follow each of the 15 lectures, which have been prepared with particular reference to use in correspondence courses. The appendix contains lists of reference literature, apparatus, and supplies required.

Housekeeping notes, edited by MABEL H. KITTREDGE (*Boston, 1911, pp. V+97*).—This series, prepared for use in the Association of Practical Housekeeping Centers in New York, includes lessons in cleaning, hygiene, cooking, the rearing of children, personal health, and the most economic use of limited means, as well as cost data for suitable furnishings for a model housekeeping flat.

A syllabus of household management, MARY L. FURST (*Teachers Col. [N. Y.] Bul., 3. ser., 1911, No. 2, pp. 24*).—An outline of the course of study in household management offered in the school of household arts, Teachers College.

Syllabus of illustrated lecture on farm homes, J. HAMILTON and G. N. MCCAIN (*U. S. Dept. Agr., Office Expt. Stas., Farmers' Inst. Lecture 12, pp. 25*).—This syllabus, for which 53 lantern slides have been prepared, is intended to direct attention to the points that make up a well-kept, attractive, and convenient home and has been prepared for the special use of farmers' institute lecturers. A list of 12 references is appended.

On the teaching of gardening in public elementary schools and the formation of school gardens, A. HOSKING (*West of Scot. Agr. Col. Bul. 49, 1909, pp. 41–74*).—The author outlines the purpose for which school gardens are formed, showing that they are primarily educational and that gardening is as educational for girls as for boys. Detailed information is given for selecting the site and laying out the school garden, including plans showing the arrangement of the various crops and how they may be changed from year to year, together with practical hints on the management of the garden, labeling the plants, qualifications of teachers, disposal of the produce, prizes, benefits of a school garden, and pupils' observations and work. Appendixes include among other data a list of crops that may be grown and times of sowing, data as to

the cost of school garden tools, etc., sufficient for 12 pupils, a school teachers' examination in cottage and allotment gardening, a suggested scheme of work, and a list of books dealing with school gardening and nature study.

School gardens in Ceylon: A brief account of the object, origin, and progress of the scheme, C. DRIEBERG (*Circ. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 21, pp. 330–336, pls. 3, fig. 1*).—The school garden scheme came into operation in May, 1901, the number of gardens being 240 at the present time. They have led to attractive grounds surrounding the schools, increased activity in the dissemination of seeds and plants, the establishment of a large number of home gardens, and the introduction of new and improved varieties of vegetables and fruits.

Boys' and girls' demonstration work in the South, O. B. MARTIN (*Bul. First Dist. Normal School, Mo., 11 (1911), No. 2, pp. 43–49*).—A review of the organization and work of the farmers' cooperative demonstration work in the South.

During 1911 nearly 100,000 farmers and more than 600 agents were engaged in this enterprise. In 1910, 46,225 boys enrolled in corn clubs and planted 1 acre of corn apiece. There were girls' canning clubs in 1911 in 8 States with a membership of 3,100.

In grading the work of the boys and girls the following points are taken into consideration: Yield, profits shown, a written report of the work, and an exhibit showing the quality of the crop.

Better farming association of North Dakota (*Northwest. Agr., 27 (1912), No. 7, p. 19*).—This article describes the work of a corporation of business men formed for the purpose of employing a number of practical but technically trained men who are to carry to the individual farmer information as to the results of research and the experience of the best farmers and to aid him in applying this knowledge.

Demonstration fields are planned in this connection.

First Wisconsin Country Life Conference (*Bul. Univ. Wis., 1911, No. 472, pp. 104, pls. 5, figs. 2*).—An account is given of this conference, held at Madison under the auspices of the College of Agriculture of the University of Wisconsin, February 14 and 15, 1911, for the consideration of the social and economic problems of country life in the State. The functions of the church, the business man, farmers' organizations, the country school, the press, and the library as factors in the life of the community were discussed.

List of state directors of farmers' institutes and farmers' institute lecturers of the United States, J. HAMILTON (*U. S. Dept. Agr., Office Expt. Stas. Circ. 114, pp. 14*).—A revision of the circular previously noted (E. S. R., 24, p. 494).

The Agricultural Institute of the University of Halle, its development and reorganization, F. WOHLTMANN (*Kühn Arch., 1 (1911), No. 1, pp. 1–59, figs. 3*).—An account of the development and present organization of the Institute.

MISCELLANEOUS.

Twenty-second Annual Report of Kentucky Station, 1909 (*Kentucky Sta. Rpt. 1909, pp. XIX+435, pls. 27, figs. 10*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1909, a report of the director on the work of the station during the year, reprints of Bulletins 139 to 146, previously noted, and reports of analyses of mineral waters and meteorological data abstracted elsewhere in this issue.

Eighteenth Annual Report of Minnesota Station, 1910 (*Minnesota Sta. Rpt. 1910, pp. XXXVI+175+8+X, pls. 3, figs. 25*).—This contains the organization list, a list of the publications of the year, a financial statement for the fiscal year ended June 30, 1910, a report of the director summarizing the work of the station and its substations, and reprints of Bulletins 117 to 120, previously noted.

Twenty-first Annual Report of Wyoming Station, 1911 (*Wyoming Sta. Rpt. 1911, pp. 91+139, figs. 3*).—This contains the organization list of the station, a financial statement for the fiscal year ended June 30, 1911, reports of the director and heads of departments, the experimental work of which is abstracted elsewhere in this issue, and a supplement reporting studies of wool fibers, noted on page 570.

Experiment station work, 1911 (*Oklahoma Sta. Circ. Inform. 18, pp. 8*).—A brief outline is given of the various projects under way at the station.

The ways, means, and outlook for the agricultural and industrial development of the State of Nevada (*Nev. Bur. Indus. Agr. and Irrig. Bul. 1, 1911, pp. 12*).—This publication gives the powers, duties, and functions of the State Commission of Industry, Agriculture, and Irrigation, as established by the legislature, March 17, 1911. An appendix contains the text of the state laws applying to the work of the commission.

Experiment Station Work, LXVII (*U. S. Dept. Agr., Farmers' Bul. 479, pp. 24, fig. 1*).—This number contains articles on the following subjects: Screening cabbage seed beds, spraying apple orchards, a new type of spray nozzle, preparation of corn for hogs, experiments in beef production, preparation of choice hams, and factors affecting the percentage of fat in cream.

Monthly Bulletin of the Library, October and November, 1911 (*U. S. Dept. Agr., Library Mo. Bul., 2 (1911), Nos. 10, pp. 263–296; 11, pp. 299–337*).—These numbers contain data for October and November, 1911, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

NOTES.

Kentucky University and Station.—The recent legislature granted a permanent appropriation of $50,000 per annum for the use of the station. This fund is to be used for experimental work with soils, horticulture, breeding and feeding live stock, dairying, and poultry husbandry, for extension work, for enlarging and operating the hog cholera serum plant, and for general maintenance. The university also received an appropriation of $50,000 per annum for maintenance and for the work of the college of agriculture.

An agricultural train of eight coaches is making a month's trip through the State. This train contains cars devoted to live stock, dairying, domestic science, agronomy, and poultry and horticulture.

Massachusetts College and Station.—Dr. Charles E. Marshall, professor of bacteriology and hygiene of the Michigan College and vice director and bacteriologist of the station, has accepted the position of director of the graduate school and professor of microbiology, and is expected to assume these duties September 1. It is the expectation to develop still further the activities of the graduate school, which since it was organized has conferred seven degrees of doctor of philosophy and fifteen of master of science, and now has an enrollment of sixteen students. A portion of Doctor Marshall's work will consist in developing definite instruction and research in bacteriology as applied to agricultural questions.

Carlton P. Jones has been appointed assistant in the fertilizer inspection in the station.

Texas Station.—The station has been granted a state appropriation of $5,000 per annum and 550 acres of land with which to develop a feeding and breeding substation. A cooperative agreement has been arranged with the Bureau of Plant Industry of this Department whereby the forage crop work at Chillicothe will hereafter be conducted upon a cooperative basis. The station is also cooperating with the Office of Farm Management, J. M. Johnson, formerly of the Savannah Chamber of Commerce, having been assigned by the Bureau of Plant Industry for the purpose with headquarters at the station.

Wisconsin University and Station.—Over 1,200 farmers from all over the State were registered in the annual farmers' course held at the college of agriculture from January 30 to February 9. In connection with the course there were held a one-week school and a course of lectures and demonstrations in home economics, a special dairy course, and a young people's course for winners of the corn growing contests conducted under the auspices of the college for the boys of the State. The second Wisconsin Country Life Conference held a two-day session at which the subjects discussed included cooperative enterprises, agricultural and home problems, country churches and schools, the relation of the farm to its village center, and community events of a social and competitive nature.

The college of agriculture, the state live stock breeders' association, and the railroads cooperated in a live stock special train which traversed southern Wisconsin from March 26 to April 6. Stops of about half a day each were made for lectures and demonstrations on horses, beef and dairy cattle, sheep, and swine.

F. J. Sievers, instructor in soils, has resigned to take charge of the soils and agronomy work of the Milwaukee County Agricultural School.

EXPERIMENT STATION RECORD.

VOL. XXVI. MAY, 1912. No. 7.

The extent to which the graduates of the agricultural colleges engage in farming has been a matter of frequent discussion ever since the colleges were established, and has sometimes been taken as a measure of the success of these institutions. Some recent studies give a definite basis for considering this subject, and also point to an increasing tendency to take up farming which has been apparent for some time to those in close touch with the work of the colleges. As this tendency is in accord with popular expectations, it is deserving of notice, along with the broader conception of what the colleges should do for the industry as a whole and for education.

The Michigan Agricultural College, the oldest of these institutions, has recently published a catalogue giving the name and occupation of each of its living graduates. This presents some interesting facts, both as to the past and to the present. From this catalogue it appears that in the fifty years since the first class went out from the institution, 996 men have graduated from the four-year agricultural course and that 877 of these are now living.

Considering the fact that nearly one-half of these men graduated before there was any other course than the agricultural, and before agriculture was seriously considered among the scientific professions, it is not surprising that a large number of them went into other than agricultural pursuits; and yet over twenty-seven per cent of all the graduates of the agricultural course are farmers. In addition, about nine per cent are connected with agricultural colleges and experiment stations, five per cent with the United States Department of Agriculture, and twenty per cent are employed in other agricultural lines, such as teaching agriculture and science in other colleges and schools, editorial work in connection with agricultural journals, agricultural work in foreign colleges and departments, landscape gardening, forestry, seed growing, agricultural chemistry, veterinary science, cheese manufacturing, and other lines for which their agricultural training was a direct preparation.

Thus, over sixty per cent of the graduates from this course are following lines of work in harmony with their college training. And when we consider that it is only within the past twelve or fifteen

years that the agricultural courses have come to be considered professional courses in any sense of the word, that is, specialized to meet the needs or the tastes of different individuals, the showing is certainly a creditable one.

If, however, we consider only the more recent graduates of the Michigan Agricultural College we shall find a much greater percentage following agricultural pursuits. Of the classes graduating from 1901 to 1905, inclusive, seventy-two per cent are engaged in agricultural pursuits, and twenty-eight per cent in other lines, and of those graduating from 1906 to 1910, inclusive, eighty-six per cent are engaged in agriculture, against fourteen per cent in other work. Taking the average for the whole ten years from 1901 to 1910, we find seventy-nine and a half per cent of the graduates engaged in agriculture. There are also more who are actually farming—thirty-two per cent in the last ten years, as compared with twenty-seven per cent for the whole fifty years.

Figures are not available from all of the land-grant institutions to show the present occupations of their graduates, but we have data concerning the later graduates from a number of institutions. According to a recent compilation as to the pursuits followed by the alumni of the Illinois College of Agriculture during the past ten years, one hundred and fifteen of the total one hundred and eighty-four graduates are engaged in farming, forty are connected with the agricultural colleges and experiment stations, seven are with the United States Department of Agriculture, and another is an agricultural editor, making about ninety per cent connected with the agricultural industry.

In 1910 there were thirty-eight graduates of the animal husbandry course at the Iowa State College. Of these, thirty engaged in farming, four became teachers in agricultural colleges, and one went into agricultural journalism. Only three of these graduates were looking for positions at commencement time, and these three wanted to become farm managers. It is stated that out of one hundred and eighty-nine recent graduates of the same institution who are engaged in agricultural pursuits, one hundred and thirty-two are farmers.

As another example, it is stated that of the recent graduates in agriculture at the North Dakota Agricultural College, forty-six and two-thirds per cent are engaged in experiment station work, sixteen and two-thirds per cent in farming, thirteen and one-third per cent in teaching agriculture in agricultural colleges, ten per cent in extension work, ten per cent in teaching agriculture in high schools, and three and one-third per cent in editorial work on farm journals. It is also reported that of the 1,582 young men who have taken the short course in agriculture at that institution during the past five years, over ninety per cent are employed in farm work.

Equally favorable results are furnished by other colleges the country over. The examples cited indicate that whatever may have been the drift of the agricultural college graduates away from the farm and its scientific problems in earlier years, there is no evidence of a similar movement among the recent graduates of the agricultural courses.

What is true of agricultural colleges in America seems also to be true of similar institutions in Great Britain. The report of the Board of Agriculture and Fisheries on the Distribution of Grants for Agricultural Education and Research in 1910–11, gives some information concerning the occupation of agricultural students in the institutions in England and Wales aided by the board. This report shows that of a total of 1,769 pupils for whom full particulars were available, 1,447 became farmers, 184 land owners, and 138 entered other occupations. In other words, 1,631 students, or over ninety-two per cent of those leaving the agricultural courses, returned to occupations connected with the land, and it is stated that among the 138 referred to as entering other occupations there are several who have been lost sight of and who may have taken up agricultural pursuits.

Many reasons have been advanced to account for the larger percentage of agricultural college graduates who now take up agricultural occupations, but all of these reasons are quite closely related to the fact that agriculture is better paid than a few years ago, and respect for it as an occupation commanding a high order of ability has materially increased. It offers a large opportunity, which is more broadly appreciated. Among the factors which have contributed to the better status of agriculture are a better understanding of the scientific problems of the farm, better living conditions on the farm, better means of communication in the country, better labor saving machinery, and better salaries for those engaged in promoting agricultural interests as teachers, investigators, extension workers, editors, or in other ways.

That the agricultural colleges and experiment stations and the Department of Agriculture have had a large share in bringing about improved conditions goes without saying. The investigations of these institutions have put farming on a better paying and more permanent basis, and thanks to their teachings, it is no longer customary for the intelligent farmer to yield ground to the grasshopper, the army worm, the brown rot, and other pests of his fields and flocks. Instead, he fights these invaders with the weapons that science has put into his hands, and for his pains secures better crops and higher prices than his careless or ignorant neighbors.

It does not take young men long to see the advantages to be secured by up-to-date practices in growing, harvesting, and marketing their

crops, nor do they hesitate long to adopt telephones, new machinery, or other appliances that will save time or increase their own efficiency. The result is that the younger generation of farmers is being recruited from the brightest and best educated of our young men, particularly from the graduates of the agricultural colleges, and that these recruits are rapidly putting into practice everything worth while from the researches of our agricultural institutions.

These young men are taking up farming with their eyes open. They realize that the farmers of the future will have to meet much sharper competition and be content to cultivate many acres of less fertile soil than those who cleared the virgin forests or broke the prairie sod, but they also see clearly that the population of the country is increasing more rapidly than the number of farms, the number of farmers, or the yield of farm products, and that this increasing population must have food and the materials from which clothing is made. Seeing these things and knowing that they can depend upon the agricultural research institutions of the country to help them solve the more difficult of their new problems as they arise, the agricultural college graduates look upon farming with optimism, as something permanent and worthy of their best endeavor.

It is, however, important that both the public and the colleges should understand that one of the most useful, and indeed necessary, functions of the agricultural colleges is to train the investigators and teachers who are to discover new agricultural truth and to disseminate this knowledge to students and to the farming communities. Whatever the agricultural colleges have done in this line in the past, and they have done much, should be credited to them as a contribution to the advancement of American agriculture.

The great movement for agricultural education and research which has gone on in this country for over half a century, and which has now culminated in active efforts to carry the new knowledge which has been acquired by this Department and the experiment stations to the masses of our rural population, has very largely been organized and led by men trained in our agricultural colleges or connected with them as teachers or investigators. For the proper conduct of this Department and the State departments of agriculture, the agricultural colleges and stations, the rapidly increasing number of secondary and elementary schools in which agriculture is being taught, and the farmers' institutes, movable schools and other extension agencies for the instruction of the thirty million people on our farms, hundreds of graduates of agricultural colleges are now required and many more will be needed in the near future.

The colleges should therefore be encouraged to increase the efficiency of their courses intended especially for the training of teachers and investigators. Congress has specifically pointed this out by

providing in the act for the enlargement of the Federal grants to these institutions, known as the Nelson Amendment, that a portion of this money may be used for the training of teachers. Many of the students in our colleges of agriculture have special aptitude for teaching or investigation. These should by all means be encouraged to follow careers along these lines.

The number and variety of positions open to the agricultural graduate who will prepare to teach or investigate is now very large, and such positions are attractive both from the opportunity they present and from a financial standpoint also. For five years the agricultural education service of this Office has been keeping account of the first salaries received by agricultural college graduates who have been appointed to such positions, and has compiled some interesting figures regarding them. In 1907 the average salary of ninety-two such graduates was $928; in 1908 the average for seventy-nine graduates was $915; in 1909, for ninety-three graduates, $955; in 1910, for ninety-five graduates, $1,017; and in 1911, for one hundred and thirty-four graduates, $987. The lowest salary among the 1911 graduates was $500 and the highest $1,600.

Considering the fact that fifteen or twenty years ago the agricultural college graduate could not hope to get over $1,000 in his first position, and that the great majority had to begin on $500 or $600, it is not surprising that in view of the larger salaries of today and of the general upward trend in agriculture, the agricultural courses in the land-grant colleges are enrolling more students and that more of the graduates of these courses are taking up agricultural pursuits.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The Kjeldahl method for nitrogen, W. VAN RIJN (*Pharm. Weekbl., 48 (1911), No. 2, pp. 27, 28; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 581, II, p. 226*).—"If it should be necessary to temporarily stop the heating with sulphuric acid, the Kjeldahl flask may be fitted with a perforated rubber cork, through which passes a tube bent at right angles and furnished near its lower end with a glass bulb. The end of the tube is made to dip into a small quantity of sulphuric acid. As the flask cools, the acid is drawn up into the bulb, and the air which follows has to bubble through the acid, and is thus freed from water vapor and any ammonia."

Apparatus for determining nitrogen according to Kjeldahl's method, KRIEGER (*Chem. Ztg., 35 (1911), No. 116, p. 1063, figs. 3*).—A description of an apparatus for preventing losses during neutralization of the digested fluid with sodium hydrate and for removing the ammonia present in the bottle.

In regard to the analysis of calcium nitrate (Norge saltpeter), lime nitrogen (calcium cyanamid), and nitrogen lime, E. DINSLAGE (*Chem. Ztg., 35 (1911), No. 114, pp. 1045, 1046*).—A comparative study of the methods for determining moisture in calcium nitrate indicated that the highest results were obtained by heating the sample directly over a micro burner, and the lowest in a vacuum over phosphoric acid or sulphuric acid. The intermediary figures were obtained by heating the sample for 3 days in sand in a drying oven. The higher results obtained with the micro burner were not due to a decomposition of the salt.

For determining nitrogen in calcium cyanamid and nitrogen lime, the author points out that the usual Kjeldahl method does not furnish good results, but when modified in the following manner is found to be more accurate: One gm. of calcium cyanamid is boiled in an open flask with 30 cc. of a mixture (cooled) consisting of equal volumes of sulphuric acid and water, and a drop of mercury. After 1½ to 2 hours the reaction is complete. If necessary, potassium sulphate can be added at the end of the heating period. The remainder of the process is the usual one, and according to the author, presents no difficulties. Twenty cc. of normal sulphuric acid is necessary for catching the distillate.

Nitrogen lime differs from lime nitrogen in that the former contains chlorin and yields an unsaponifiable oily substance, which can be extracted with ether. See also previous notes (E. S. R., 25, p. 805; 26, p. 109).

The valuation of calcium nitrite and nitrate, STUTZER and GOY (*Chem. Ztg., 35 (1911), No. 97, p. 891*).—It was found by determining the nitrite present with potassium permanganate by titration and determining the total nitrate in the oxidized fluid by Busch's nitron method that this procedure will yield satisfactory results for examining commercial calcium nitrite and nitrate alone or in a mixture with each other. The figures obtained were as follows: Total nitrogen as obtained by Devarda's method 19.10, nitrite nitrogen by titration with potassium permanganate 17.52, and the total nitrogen in the oxidized

fluid by Busch's method 19.02 per cent. The Devarda procedure was the cheapest.

Potassium: Its qualitative detection as the cobalti-nitrite, L. T. Bowser (*Jour. Amer. Chem. Soc., 33 (1911), No. 10, pp. 1566–1569*).—"Summarized, the procedure is as follows: Place 5 cc. of the potassium solution in a tall beaker of 50 cc. or 100 cc. size, set on a mirror beside it 5 cc. of pure water in a similar beaker, and add to each 2.5 cc. of sodium cobalti-nitrite reagent and 5 cc. of 95 per cent alcohol. If upon looking down through the solutions into the mirror an equally sharp image of the observer can be seen in each beaker there is no potassium present; if the test solution shows a dimmer image than the blank, potassium is present amounting to 2 or more parts per million. The only precautions necessary are to avoid making the test in an atmosphere dense with ammoniacal fumes, to be certain of the absence of ammonium from the solution, and to be certain that the solution is neutral or slightly acid with acetic acid."

Determination of magnesium as magnesium oxid, O. Kallauner (*Chem. Ztg., 35 (1911), No. 125, pp. 1165, 1166*).—Magnesium carbonate, oxalate, nitrate, and chlorid can be converted into magnesium oxid by heating. The first 3 are decomposed with ease, magnesium chlorid less readily. Quantitative results could not be obtained by heating magnesium chlorid alone or in the presence of mercuric oxid. The decomposition can, however, be accelerated by increasing the temperature and the time of heating, in the Berzelius method, and by repeated evaporation in the presence of mercuric oxid. Only when the procedure is thus carried out are the results satisfactory for technical purposes.

The assertions of Rose and Krause are substantiated by the author's work, as well as the criticism of Pfeiffer's method made by Emde and Senst.

Some new findings in the chemistry of water, C. Blacher (*Chem. Ztg., 35 (1911), No. 40, pp. 353, 354; 41, pp. 370–372; 43, pp. 390–392; 44, pp. 398, 399*).—A critical study, with particular regard to the technical and analytical chemistry of water.

The phytosterol content of soy beans, H. Matthes and A. Dahle (*Arch. Pharm., 249 (1911), No. 6, pp. 436–444; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 18, p. 1124*).—The unsaponifiable portion of the soy-bean oil, which amounts to about 0.7 per cent, can be easily separated with petroleum ether into a crystalline portion (55 per cent) and a soluble liquid portion (45 per cent). The crystalline portion is composed of 2 compounds, namely, (a) about 2.4 per cent of phytosterol (melting point 169° C.), "which has 2 double linkages and is strongly levorotatory; it is identical with the stigmasterol isolated from Calabar beans by Windaus and Hauth; (b) about 97 per cent of a levorotatory phytosterol with 1 double linkage and melting at 139°. The liquid portion of the unsaponifiable portion of soy-bean oil consists of unsaturated oxygenated compounds, which give the phytosterol reaction. Elementary analysis gave the same proportion of carbon and hydrogen as in the case of phytosterol (b). Experiments made to separate the phytosterol-like constituent of the liquid portion by Windaus' method with digitonin were unsuccessful."

In regard to the relation of the hemagglutinating and precipitating capacity of plant antigens, H. Raubitschek and M. Wilenko (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 5 (1910), No. 4, pp. 446–457*).—The protein precipitating and hemagglutinating properties of many phytalbumins are not closely related, and the reactions must, therefore, be considered to be due to 2 distinctly separate substances. In this work plant antigens were also found to differ in regard to this point from inorganic colloidal acids.

The cleavage of nitrogen-containing substances by yeast, O. Schwarz (*Biochem. Ztschr., 33 (1911), No. 1, pp. 30, 31; abs. in Zentbl. Biochem. u.*

Biophys., 11 (1911), No. 23, pp. 951, 952).—As a result of sugar-free fermentation experiments, in which the media contained citric acid and suprarenin, the author believes that the carbon dioxid involved in the process had its origin in the citric acid of the media.

Is the action of rennet one of cleavage? E. COUVREUR (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 1, pp. 23, 24*).—The whey from milk which had been coagulated quickly with rennet in an aseptic and antiseptic solution was found to be free from albumoses. This is further proof (E. S. R., 25, p. 202) that rennet does not cleave caseinogen.

A heat-tolerating lipase, N. L. SÖHNGEN (*Chem. Weekbl., 8 (1911), No. 29, p. 580*).—A lipase was isolated from micro-organisms which is capable of withstanding a temperature of 100° C. for 5 minutes without losing its lipolytic activity.

Food adulteration, its detection and prevention, A. BEYTHIEN (*Samml. Chem. u. Chem. Tech. Vorträge, 16 (1910–11), pp. 1–140*).—A critical discussion in regard to the present status of food adulteration, the nature of the adulterations and their detection, and the laws in regard to adulteration.

Rapid summary examination of foods with tablet reagents, P. BRUÈRE (*Ann. Falsif., 4 (1911), No. 29, pp. 148–154, figs. 2; abs. in Chem. Zentbl., 1911, I, No. 22, p. 1611*).—Nessler's reagent for ammonia, the Schardinger and guaiacol-perborat reagents for milk, and some reagents for detecting plastered wines are considered in this article. All are in the form of tablets.

Judgment of honey on the basis of Fiehe's reaction, H. LÜHRIG and A. SCHOLZ (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 12, pp. 721–741*).—These tests were conducted with solutions of saccharose alone, mixtures of honey and saccharose, and pure honey, with acetic, propionic, formic, lactic, butyric, hydrochloric, citric, malic, salicylic, tartaric, valerianic, benzoic, and hydrofluoric acids, and with acetaldehyde, propylaldehyde, hexamethylentetramin, and abrastol.

The results point to the conclusions that Fiehe's reaction is caused not only by the action of hydrochloric acid on saccharose, but also by organic acids and other compounds. Hydrochloric acid, however, was found to be the best reagent and oxalic acid the second best. A 0.2 per cent solution of oxalic acid is sufficient to detect an admixture of 7 per cent of saccharose in honey. The solution, however, must be heated. Therefore, honeys which contain oxalic acid (normally) and saccharose will give Fiehe's reaction after heating.

Analyses of 91 honeys are reported.

On the coloring matter in fruit juices, E. H. S. BAILEY and E. L. TAGUE (*Abs. in Trans. Kans. Acad. Sci., 23–24 (1909–10), pp. 41, 42*).—"This work was undertaken in order to find out, if possible, some scheme for detecting the different natural colors of fruit juices, and also the different artificial colors used in the preparation of food products. Experiments were made upon the juice of red raspberries, black raspberries, huckleberries, strawberries, blackberries, red currants, and black cherries. The work was carried out along 3 lines, viz, (1) to find new solvents for natural colors, (2) to apply known tests to these extracts, and (3) to find new characteristic tests to be applied to coloring matters extracted by known methods.

"The solvent power of carbon tetrachlorid, several hydrocarbons, and sulphonic acids were tried with negative results. It was found that ethyl alcohol, propyl alcohol, and isobutyl alcohol were good solvents, if the fruit juice was first saturated with sodium chlorid. Cymene, quinolin, and pyridin were found to be good solvents. Cymene would extract the coloring matter from other extracts, e. g., acetone, and leave the original clear and colorless. Pyridin gave characteristic reactions with the fruit juices themselves.

"An effort was made to diazotize the different coloring matters, with some encouraging results. The effects of oxidizing and reducing agents were tried and the resulting colors were tested with (1) acids, (2) bases, and (3) salts, and results tabulated. Several oxidizing and reducing agents were tried, among which bromin was found to be the best oxidizing agent and sodium hydrosulphite the best reducing agent. The above scheme of oxidation and reduction, with subsequent treatment with acids, bases, and salts, gave splendid results.

"The work was extended so as to include some of the coal-tar colors and also some of the harmless vegetable colors permitted to be used in food products. The tables of the results show that natural fruit juice colors can be readily distinguished from each other and from the coal-tar dyes, as well as from the vegetable dyes, in this manner."

The judging of milk and cream chocolates, Baier (*Ztschr. Angew. Chem., 24 (1911), No. 31, pp. 1485, 1486*).—This is a discussion in regard to standards for these confections.

Coal-tar colors used in food products, B. C. Hesse (*U. S. Dept. Agr., Bur. Chem. Bul. 147, pp. 228, fig. 1*).—The purpose of this work was to determine what members of the synthetic or coal-tar colors ought to be made legal for coloring foods. It contains data in regard to original work done with anilin colors in the Bureau of Chemistry since the passage of the Food and Drugs Act, and also a survey of the literature with special reference to the harmfulness of these colors. The subject is treated under the following headings: Identity of coal-tar colors used in food products in the United States in 1907; purposes of food coloring; food color requirements; conformity of food color market, 1907, to recommendations of the National Confectioners' Association, 1899; some legal enactments relative to the use of coal-tar dyes; recommendations by associations and individuals as to use of coal-tar dyes as food colors; recommendations made by the United States color industries and trades to this Department; investigations, other than on animals, bearing on the harmfulness of coal-tar colors; compilation under the A. G. Green Table numbers of all information available as to the suitability of coal-tar colors for food; dosage and symptoms; oil-soluble or fat colors; rules and reasons for selecting the seven colors permitted by F. I. D. 76; lists of colors subsequently recommended by individuals and associations; chemical examination of the 7 permitted colors, 1907; guides in determining degree of purity and cleanliness; analyses of certified lots of permitted colors, 1909–10; and methods of analysis used in testing colors for certification.

The conclusions drawn are that "coal-tar dyes should not be used indiscriminately in foods; only specified coal-tar dyes should be used in foods; [and] only tested and certified dyes should be used in foods."

The chemical preservatives, H. Serger (*Chem. Ztg., 35 (1911), Nos. 121, pp. 1127–1129; 123, pp. 1150–1152; 125, pp. 1166–1168*).—A discussion in regard to their uses and detection.

The determination of benzoic acid, O. Folin and F. F. Flanders (*Jour. Amer. Chem. Soc., 33 (1911), No. 10, pp. 1622–1626*).—After numerous experiments the authors chose the following procedure:

Twenty-five gm. of the ketchup in question is weighed out in a 500 cc. beaker and treated with 2 cc. of concentrated nitric acid and well stirred. The bleached mass is transferred to a 500 cc. separatory funnel with 200 cc. of saturated ammonium sulphate solution, and extracted 5 times successively with 50, 35, 25, 25, and 25 cc. of chloroform. Violent shaking must be avoided. The chloroform extracts are then drawn into a separating funnel containing 200 cc. of a saturated solution of sodium chlorid, which contains 3 cc. of 10 per cent hydro-

chloric acid per liter, and shaken. When the layers have cleared, the chloroform layer is drawn into another separating funnel containing 200 cc. of acidified sodium chlorid solution, shaken, drawn off, from 4 to 5 drops of alcoholic phenolphthalein solution added, and titrated with a standard solution of sodium ethoxid, which is prepared by dissolving 2.3 gm. of cleansed metallic sodium in 1 liter of absolute alcohol. The volumetric solution may be standardized against pure benzoic acid in chloroform.

Report of the Java Sugar Station for the year 1910 (*Jaarver. Proefstat. Java Suikerindus., 1910, pp. 79, tables 2*).—This is a detailed report in regard to administrative and scientific work at the station for the year 1910.

Distribution of the phosphoric acid in milk, F. Bordas and F. Touplain (*Ann. Falsif., 4 (1911), No. 31, pp. 229–231; abs. in Analyst, 36 (1911), No. 424, p. 345*).—Previously noted from another source (E. S. R., 25, p. 312).

In regard to the historical development and the principal significance of biological milk investigations from the chemical, hygienic, and forensic standpoint, K. Schern (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 42, pp. 761–767*).—This is a critical discussion of almost all of the methods thus far proposed for detecting milks of pathologic origin.

The technique of the milk-rennet inhibition test, K. Schern (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 38, pp. 700–703, figs. 2*).—The author here gives in detail the technique of his method, the results with which have already been noted (E. S. R., 21, p. 707).

The technique of the milk-rennet inhibition test (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 39, p. 710*).—A correction in regard to some typographical errors which occurred in the article noted above.

The determination of the specific gravity of small quantities of milk, A. Kreidl and E. Lenk (*Biochem. Ztschr., 35 (1911), No. 1–2, pp. 166–168*).—Assuming that the fat of milk is not readily extracted or dissolved by the ordinary fat solvents alone because the casein apparently forms a membrane over the globules, the authors prepared mixtures consisting of benzene and chloroform, benzene and carbon tetrachlorid, etc., which had the specific gravity of the average normal milk, and placed 1 drop of the milk on a portion of the mixture. This drop would either float upon the surface or sink, according to its specific gravity.

The detection of benzoic acid and salicylic acid in milk, E. Philippe (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 2 (1911), No. 6, pp. 377–383*).—This discusses Breustedt's reaction (E. S. R., 11, p. 419), which utilizes Ritthausen's principle, viz, copper sulphate for precipitating the proteins of milk, and acidified ether for extracting the salicylic or benzoic acid from the filtrate therefrom. Jonescu's (E. S. R., 21, p. 523) and Mohler's methods for detecting benzoic acid (E. S. R., 25, p. 503) were also used. The usual methods for salicylic acid were found satisfactory.

For differentiating various kinds of butter, F. Schaffer and T. von Fellenberg (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 2 (1911), No. 4, pp. 209–220*).—The purpose of the tests reported was to determine how butter which is prepared from pasteurized cream behaves in regard to the various enzym reactions (reductase, oxidase, etc.), and furthermore to see if the ordinary butter can be distinguished from centrifuged whey butter and Vorbruch butter on the basis of the composition of the ash, particularly calcium.

Detection of coconut oil in butter, A. Hepner (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 12, pp. 758–760; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 15, pp. 974, 975*).—When cows were fed on beet leaves the composition of the butter fat was such that when examined by Fendler's second

method (E. S. R., 23, p. 418) one would be led to suspect that it was adulterated with 10 per cent of coconut oil.

Coconut oils of high iodin numbers, W. D. RICHARDSON (*Jour. Indus. and Engin. Chem., 3 (1911), No. 8, p. 574; abs. in Chem. Ztg., 35 (1911), No. 125, Repert., p. 519*).—Coconut oils from various shipments had iodin numbers of from 18 to 24. An inquiry brought out the fact that 2 factories mixed the copra oil with the oil from parings of the rind from the coconut meat. The oil obtained from fresh meat by extracting with ether in the cold was found to have a figure of 8.9, and that from the rind one of 40.25.

In regard to the examination of copra (*Chem. Ztg., 35 (1911), No. 82, p. 755*).—Owing to the fact that uniform methods are not used for determining the fat contained in copra products, uniform results are not obtained in the laboratories dealing with copra products. A method is therefore proposed which it is believed ought to be used by the copra industry in general.

Candelilla wax, J. M. SANDERS (*Proc. Chem. Soc. London, 27 (1911), No. 390, p. 250; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 21, p. 1266*).—"A sample of candelilla wax, prepared in the month of January, 1911, from plants collected in Coahuila, had the appearance of a greenish white mass with a granular fracture. It contained a considerable proportion of water, and when freed from this, was dark brown, and gave the following values: Melting point 67.5° C., density 0.9850, acid value 14.39, saponification value 46.76, iodin value (Hübl) 16.6 per cent, unsaponifiable matter 77 per cent, hydrocarbons 48.6 per cent. The wax contained hentriacontane and myricyl alcohol."

A modification of the Herzfeld-Bohme method for the detection of mineral oil in other oils, F. P. VEITCH and M. G. DONK (*U. S. Dept. Agr., Bur. Chem. Circ. 85, pp. 15, fig. 1*).—The Herzfeld-Bohme method[a] was modified for the purpose of detecting additions of small amounts of mineral oil to turpentine. It is conducted as follows:

Run 20 cc. of 38-normal sulphuric acid into a Babcock bottle, stopper, and place in ice water, cool, add 5 cc. of the turpentine, again cool, and gradually mix the contents, cooling from time to time (the temperature should not be allowed to rise materially), and when the mixture no longer warms up after shaking agitate thoroughly. Then place the bottle in a water bath in which the water is on a level with the acid and heat to from 60 to 65° C. in the course of from 5 to 10 minutes, keeping the contents thoroughly mixed by vigorously shaking 6 or 7 times. Thorough mixing is one of the essential features of the method.

"Do not stopper the bottles after turpentine has been added, as they may explode. Cool to room temperature, add ordinary sulphuric acid until the contents rise in the graduated portion of neck, and whirl at 1,200 revolutions per minute for 3 or 4 minutes, or allow to stand over night, and read the amount of supernatant liquid. When a small amount of adulterant has been added it is preferable to use a centrifugal machine, reading the refractive index of the upper portion of the residue immediately, as the mineral oil and residual turpentine alteration product are thus stratified, the low-reading mineral oil constituting the upper portion. A capillary pipette is used in transferring a small portion of the residual oil to the refractometer. . . .

"With a pure turpentine there will be from 0.02 to 0.05 cc. of a straw-colored, viscous residue, which, if read at once, gives a refractive index at 20° of 1.5100 or higher. When adulterated with mineral oil, the residue is a limpid or oily, colorless liquid, having a refractive index of 1.505 to 1.4300 or lower, depending on the kind and amount of adulterant present."

[a] Chem. Ztg., 30 (1906), p. 633.

Wild volatile-oil plants and their economic importance: I, Black sage; II, wild sage; III, swamp bay, F. RABAK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 235, pp. 37, figs. 6*).—Following a discussion of the present production of volatile oils from wild plants native to the United States and their importance, this bulletin contains analyses of 3 heretofore unutilized plants, black sage (*Ramona stachyoides*) from California, wild sage (*Artemisia frigida*) from South Dakota, and swamp bay (*Persea pubescens*) from Florida. These plants are deemed of economic importance on account of the oils which they contain and the camphoraceous constituents which are contained in the oils themselves.

"The oil of black sage is composed essentially of camphor (more than 40 per cent) and cineol (22.5 per cent), with a small quantity of an alcohol, probably borneol, both free and as an ester, and a small quantity of the ketone thujone, with traces of the terpenes pinene and terpinene. Free formic acid was found, and only traces of combined acetic and formic acids in the form of esters. The constituents of possible economic importance in the oil are camphor and cineol."

"The oil of wild sage may be said to be composed: (1) Of total borneol camphor, 43 per cent, of which about 6.8 per cent exists as bornyl heptoate (calculating the esters of the oil as heptoic acid salts of borneol), leaving 35.8 per cent of free borneol camphor present in the oil; (2) of cineol (eucalyptol), 18 to 20 per cent; (3) of fenchone, 8 to 10 per cent; (4) of free acids, chiefly œnanthylic, or heptoic, acid, 0.58 per cent, with traces of formic and caprylic acids; (5) of combined acids in form of esters, chiefly, œnanthylic acid, with smaller quantities of valerianic, undecylic, and formic acids. It is very probable that a small amount of terpenes were also present in the portion distilled below 175° C., which, however, were not identified."

"The oil of swamp bay contains over 21 per cent of camphor, 19.8 per cent cineol, and borneol, the latter possibly occurring to a small extent as esters and as the free alcohol. No terpenes were identified. Since only a very small portion of the oil distills over below 175° C., it would seem that the oil is not terpenic in character, as most members of the terpene group of hydrocarbons boil below 175° C. Besides the constituents mentioned, the oil contains butyric acid in free condition to a slight extent; butyric, valerianic, and heptoic acids combined in the oil as esters, valerianic acid predominating, and a slight trace of an aldehyde, possibly formaldehyde."

Particular stress is laid upon the fields (medicine, arts, etc.) in which the above oils and their components may be used.

Investigations in regard to the stearin of wool fat, E. COEN (*Abs. in Chem. Ztg., 35 (1911), No. 56, p. 508*).—Wool fat contains from 18 to 28 per cent of unsaponifiable substances, corresponding to from 62 to 72 per cent of fat. The saponification figure fluctuates between 118 and 136, which when referred to the saponifiable matter alone averages 163. Owing to the fact that fatty acids of high molecular weight are present, the latter figure will indicate the difference between the stearin and that of the other fatty substances of wool fat which have a higher saponification number.

The acetyl figure of the unsaponifiable part of wool fat varies between 25 and 27, and the content of higher alcohols calculated to cholesterol between 18.4 and 27.3 per cent. The hydrocarbons are solid, the specific gravity lying between 0.924 and 0.936 at 15° C., the iodin number between 26 and 34, and the polarization at from 20 to 25° between +11.7 and +15.2°.

The technical utilization of the nonsugar substances of the sugar beet. F. EHRLICH (*Chem. Ztg., 35 (1911), No. 73, pp. 661–663; abs. in Chem. Zentbl., 1911, II, No. 7, p. 495*).—The author discusses the possibilities of utilizing the pectin substances of the beet, the various uses for molasses, the production of

potash and sodium cyanid from the final leachings in the strontium disintegration process, and finally the making of organic chemical products from molasses, particularly the extraction and utilization of betain.

Vegetable milk and casein, F. J. G. BELTZER (*Rev. Chim. Indus., 22 (1911), No. 259, pp. 209–212; Sci. Amer. Sup., 72 (1911), No. 1859, p. 115*).—This is a discussion in regard to the utilization of soy-bean products, particularly for producing vegetable milk, casein, and a variety of other products.

Process of manufacturing industrial alcohol, glucose, and pure cellulose from vine shoots, P. VARIOT (*French Patent 429,825, May 3, 1911; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 22, p. 1329*).—The vine shoots, which contain 21.16 per cent of starchy matter and 31.7 per cent of cellulose, are ground and boiled with dilute sulphuric acid. The acid solution of glucose resulting is decanted and expressed from the residue, neutralized with lime, fermented, and distilled. The residue is ground, macerated with cold, concentrated sulphuric acid, and the process repeated. Yields of 140 and 150 liters, respectively, of 90 per cent alcohol are obtained from the 2 treatments. If desired, the cellulose residue may be used for paper making.

Report on the study of fermentations in the manufacture of Jamaica rums, S. F. ASHBY (*Rpt. Jamaica Sugar Expt. Sta., 3 (1908–1910), pp. 108–129*).—This article discusses types of rum, micro-organisms of the distillery, sending and preparing yeasts for estates, experiments with fission yeasts in dunder and concentrated cane juice wash, distillery experiments, the rice grain bacterium, orange wine, orange vinegar, yeast cultures in cane juice peptone broth, and the literature of rum and fermentation.

Methods for the utilization of wood waste, G. WALKER (*Jour. Soc. Chem. Indus., 30 (1911), No. 15, pp. 934–936*).—This has particular reference to the use of wood waste for the products of destructive distillation.

Extracts from the proceedings of the Association of Official Agricultural Chemists, 1911 (*U. S. Dept. Agr., Bur. Chem. Circ. 90, pp. 19*).—This is an advance circular giving the recommendations of the referees, most of which have been previously noted (E. S. R., 26, p. 97), as well as some of the proceedings which affect the work of 1912.

METEOROLOGY—WATER.

Climatic control, L. C. W. BONACINA (*London, 1911, pp. VIII+167, pls. 3, figs. 23*).—This is one of a series of small textbooks prepared for use in schools, and deals briefly with general principles of climatology, types of land in relation to climate in the British Isles and in some foreign countries, the influence of climate on man individually indoors and out-of-doors, and the influence of climate on man from the standpoint of race and nationality. There is also a brief chapter on meteorology with a short list of standard works on this subject.

Phenology and climatology in the service of fruit culture and agriculture, JOCHIMSEN (*Fühling's Landw. Ztg., 61 (1912), No. 1, pp. 26–33*).—This article reviews the phenological work of G. Karsten, W. Köppen, E. Ihne, and others, and urges the importance of extending such observations and introducing the more general use of phenological charts.

Monthly Weather Review (*Mo. Weather Rev., 39 (1911), Nos. 10, pp. 1467–1632, pls. 9, figs. 12; 11, pp. 1633–1790, pls. 10*).—In addition to the usual climatological summaries, weather forecasts and warnings for October and November, 1911, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a

condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 10.—Severe Windstorm Crosses the State of Indiana, by V. H. Church; Wisconsin River Flood of October, 1911 (illus.), by J. H. Spencer; Flood Report, by B. L. Waldron; The Flood in the Rio Grande, by F. H. Brandenburg; Floods in Southwestern Colorado and Northwestern New Mexico, by F. H. Brandenburg; Notes on the Rivers of the Sacramento and San Joaquin Valleys for October, 1911, by N. R. Taylor; The Cyclonic Distribution of Rainfall in the United States, etc. (illus.), by W. G. Reed; and A Noteworthy Aurora, by D. Manning.

No. 11.—Tornado at Owosso, Mich., by F. H. Coleman; Tornado near Davenport, Iowa, on November 11, 1911, by J. M. Sherier; Freezes of November 13 and 29–30, 1911, in the Sugar, Orange, and Trucking Region, by I. M. Cline; Abnormalities of November Weather at Springfield, Mo., by J. S. Hazen; and Notes on the Rivers of the Sacramento and San Joaquin Watersheds during November, 1911, by N. R. Taylor.

Meteorological summaries (*Kentucky Sta. Rpt. 1910, pp. 330–333*).—Tabular summaries are given of observations during 1910 on atmospheric pressure, temperature, precipitation, cloudiness, wind movement, and miscellaneous phenomena at the State University at Lexington.

Climate of Honolulu, J. Hann (*Met. Ztschr., 29 (1912), No. 1, p. 34*).—The available records of observations on pressure, temperature, rainfall, and wind movement are briefly summarized.

California evaporation records, E. Duryea, Jr. (*Engin. News, 67 (1912), No. 9, pp. 380–383*).—The results of 2 series of observations on evaporation from water surfaces, one on Lake Tahoe, Nevada, and the other in the Santa Clara Valley, California, are reported and discussed.

The greatest rainfall of the world (*Rev. Sci. [Paris], 50 (1912), I, No. 5, p. 144*).—It is stated that there was a fall of 2,238.7 mm. (88.08 in.) of water in one continuous rain July 14 to 17, 1911, at Baguío-Mirador, Philippine Islands. This is second only to a fall of 2,898 mm. July 12 to 16, 1876, at Cherra Punji, Assam. The maxima for a single day are Baguío, July 14, 1911, 880 mm.; Suva (Fiji), August 8, 1906, 1,041 mm.; Cherra Punji, July 14, 1876, 1,036 mm.; Tanabe, Japan, August 19 to 20, 1889, 902 mm.; Purniah, Bengal, September 13, 1879, 889 mm. The maximum for Europe is Riposta, Sicily, November 17, 1898, 465 mm.

The amounts of nitrogen as ammonia and nitric (and nitrous) acid in the rain water collected at Uithuizermeeden, Groningen, J. Hudig (*Jour. Agr. Sci., 4 (1912), No. 3, pp. 260–269, figs. 3*).—Determinations of nitrogen as ammonia and as nitric acid in samples of rain water collected from July, 1908, to December, 1910, are reported and discussed.

Of the total nitrogen 75.3 per cent was nitrogen as ammonia and 24.7 per cent nitric nitrogen, but the total amount and relative proportion of the different forms of nitrogen were so variable that the author advises a systematic study of the subject. On the basis of a mean rainfall for the Netherlands of 700 mm., containing 0.724 mg. of nitrogen as ammonia and 0.237 mg. of nitric nitrogen per liter, or 0.961 mg. of total nitrogen, it is estimated that the annual rainfall of that country carries down 5.99 lbs. of nitrogen per acre.

Mineral waters, S. D. Averitt and O. M. Shedd (*Kentucky Sta. Rpt. 1910, pp. 323–329*).—Partial mineral analyses of samples of water received from different parts of the State are reported.

The irrigation of soils with sewage and its effect on the composition of the soil, H. Knopf (*Die Berieselung des Bodens mit Spüljauche, Ihre Wirkung auf die Zusammensetzung des Bodens mit besonderer Berücksichtigung des Kalkge-*

halts. Berlin, 1911, pp. 59; rev. in Wasser u. Abwasser, 5 (1912), No. 2, pp. 79–81).—Studies on the character and composition of the soil of one of the sewage farms near Berlin before and after several years' application of sewage showed that the humus, nitrogen, and potash content of the surface soil was doubled under sewage irrigation. The phosphoric acid was appreciably increased to a depth of 1 meter, but the lime content was decidedly decreased. Further investigations showed that not only did the sandy soil which was used in these experiments have a low absorptive power for lime, but that the application of sewage brought about conditions favorable to the solution and leaching out of the lime of the soil.

Detailed analytical data are given and work of other investigators on the same subject is reviewed.

Notes on sewage sludge and its disposal, J. Grossman (*Jour. Soc. Chem. Indus., 31 (1912), No. 1, pp. 3–7; Surveyor, 41 (1912), No. 1050, pp. 352, 358–360*).—Discussing the agricultural utilization of sludge, the author refers to the report of the British Royal Commission as showing that sewage sludge does not as a rule produce the fertilizing effect which its content of nitrogen, phosphoric acid, and potash would lead one to expect, and he suggests that this is due to the fact that grease predominates to such an extent in the sludge as to render the manurial constituents practically inoperative. After examination of various methods of disposal, he has reached the conclusion that the best method of utilization is distillation with superheated steam for the production of gas and ammonium sulphate.

"The hygienic disposal of sewage sludge is the keystone of sewage purification, and the most rational mode of sludge disposal is that of putting it back on the land. But to use it in the shape of sludge, wet, pressed, or dried, for farming purposes is nearly always impracticable and always open to serious objections on hygienic grounds. There will always be a suspicion that it may disseminate disease amongst cattle and human beings; it should never be used where cattle is grazing, and not where the plant shoots have appeared above ground. . . . Ordinary drying of sludge is no guaranty of sterilization. To make the sludge available for farming purposes it must be deprived of its grease, and the residue exposed to such a temperature as will be a guaranty that it is thoroughly sterilized."

Sewage sickness in land filtration, J. E. Purvis, A. C. N. McHattie, and R. H. J. Fisher (*Jour. Roy. Sanit. Inst., 32 (1911), No. 9, pp. 439–442; abs. in Wasser u. Abwasser, 5 (1912), No. 2, p. 83*).—Examinations of the Cambridge sewage farm on which 2,250,000 gal. of sewage daily were being disposed of on an area of 102 acres, rotating on 25 acres at a time, showed that certain of the sections were sewage sick. This was found to be a physical condition due to blocking up of the pores of the soil by suspended solids and growths and was easily and cheaply corrected by plowing and harrowing the land. Cropping was not considered necessary.

SOILS—FERTILIZERS

The chemical nature of the organic nitrogen in the soil, S. L. Jodidi and A. A. Wells (*Iowa Sta. Research Bul. 3, pp. 113–134*).—Investigations in continuation of those already noted (E. S. R., 26, p. 320) are here reported.

These reports deal more fully than the previous articles with the nature of the organic nitrogenous compounds in soils treated with various organic materials under different cropping systems. The more important conclusions reached are that "the amount of ammoniacal nitrogen in all of the plats examined is insignificant, ranging from 0.000649 to 0.001508 per cent of the oven-

dried soil, or from 0.203 to 0.653 per cent of the total soil nitrogen. Likewise, the proportion of nitric nitrogen is small, namely, from 0.00005 to 0.00269 per cent of the oven-dried soil, or from 0.02 to 1 per cent calculated upon the total soil nitrogen. This leaves about 99 per cent of the total soil nitrogen in the form of organic compounds. The proportion of amido nitrogen is quite considerable, ranging from 26.99 to 33.83 per cent calculated upon the nitrogen obtained in solution by boiling with hydrochloric acid. Among the nitrogenous compounds, contained in the rest of the acid-soluble nitrogen, the monamino acids and diamino acids were found to be present in considerable quantities."

Influence of various factors on decomposition of soil organic matter, S. L. Jodidi and A. A. Wells (*Iowa Sta. Research Bul. 3, pp. 135–154, pls. 2, figs. 2*).—Taking the production of carbon dioxid of the soil as a convenient measure of the rate of oxidation of humus, the authors undertook a series of determinations of combined carbon dioxid and of free carbon dioxid and oxygen in soils of plats differently treated and cropped. The combined carbon dioxid was determined by a modification of the method of Mulder, Stolba, and Kolbe. The free carbon dioxid and oxygen were determined in the soil air by means of the Orsat apparatus. The soil air was obtained by driving an iron tube $\frac{5}{8}$ in. in diameter and having perforations in its lower end into the soil to the desired depth, then drawing the desired amount of air through the Orsat apparatus by means of an aspirator.

Determinations of both carbon dioxid and oxygen were made once a day on 22 plats during April to August, 1910. The average percentage of oxygen in the soil atmosphere for all of the plats during this period was 20.51 per cent. The average amount of carbon dioxid was 0.252 per cent. These figures indicate that the total percentage of carbon dioxid and oxygen in the soil atmosphere is about the same as in the air.

It was found that an increase of moisture and temperature as well as tillage operations was followed by a more rapid decomposition of the organic matter in all of the plats. There was, however, wide variation in rapidity of decomposition of the organic matter and it was apparently determined more by the character than the amount of organic matter present. For example, a plat which contained a high percentage of humus derived from peat showed the lowest amount of carbon dioxid in the soil atmosphere.

The movement of nitric nitrogen in soil and its relation to nitrogen fixation, R. Stewart and J. E. Greaves (*Utah Sta. Bul. 114, pp. 181–194; abs. in Science, n. ser., 35 (1912), No. 893, p. 228*).—This is a paper presented at the Washington meeting of the Society of American Bacteriologists in December, 1911, summarizing studies made at the Utah Station during the past 8 years on the influence of irrigation upon the production and movement of nitric nitrogen in the soil (E. S. R., 22, p. 617), and stating that these investigations, which have been conducted on what is considered soil ideally adapted both chemically and bacteriologically to support rapid bacterial action, have shown an amount of nitric nitrogen to a depth of 10 ft. not exceeding 300 lbs. per acre—much less than has been found in other western soils and attributed to fixation in place of atmospheric nitrogen.

From an examination of the analytical data for soils containing very high percentages of nitrate reported by W. P. Headden (E. S. R., 23, p. 221; 25, p. 814), the authors conclude that there is a certain parallelism between the accumulation of nitric nitrogen and chlorin, indicating a common origin. "This origin is indicated by the deposits occurring in the country rock, such as noted in the shales of Colorado, the sandstones of Idaho, and the rocks of southern Utah and Nevada" (E. S. R., 26, p. 226). Although the authors do not maintain "that nitrogen fixation may not take place to a certain extent

in the Colorado soils, and in some places to an appreciable extent," they do maintain "that whatever theory is used to account for the accumulation of chlorids in the Colorado soils will also account for the greater portion of the nitrates present."

Ammonia and nitrate assimilation by micro-organisms of the soil, J. VOGEL (*Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 6–12, pp. 169–179; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 4, pp. 195, 196*).—The experiments with culture solutions and with natural soils here reported led to the conclusion that while there is an appreciable formation of albuminoid matter from ammonia and nitrate in culture solutions there is no such fixation of nitrogen in natural soil, and that the fixation of ammoniacal nitrogen is promoted by the addition of calcium carbonate in culture solutions but not in the case of natural soils. When calcium carbonate was present in soils containing ammonia salts there was considerably greater loss of nitrogen than could be entirely accounted for by the volatilization of the ammonia, and the author is of the opinion that under the conditions prevailing in these experiments, involving imperfect aeration, there was a loss of nitrogen due to denitrification.

Inoculation experiments with Azotogen, M. POPP (*Deut. Landw. Presse, 38 (1911), No. 42, pp. 492, 493; abs. in Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 6–12, p. 269*).—Comparative tests on horse beans of (1) seed inoculation with gelatin cultures, (2) seed inoculation with soil cultures, and (3) soil inoculation with soil cultures, made on upland moor soil which had never grown horse beans, showed decided benefit from inoculation in all cases, but especially from seed inoculation.

The direct assimilation of inorganic and organic forms of nitrogen by higher plants, H. B. HUTCHINSON and N. H. J. MILLER (*Jour. Agr. Sci., 4 (1912), No. 3, pp. 282–302, pl. 1; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 4, p. 195*).—This is a somewhat more detailed account of investigations of which a brief report has already been noted (E. S. R., 26, p. 32).

It is stated that the results which were obtained in water cultures with peas are not yet sufficiently numerous to make it possible to trace any connection between the assimilability and the composition of the nitrogenous compounds. In the experiments reported the best results were obtained with urea and barbituric acid if humus, which is of indefinite chemical composition, is excluded. Next in order were acetamid, ammonium sulphate (without calcium carbonate), formamid, alloxan, glycin, alanin, peptone, oxamid, guanidin, and cyanuric acid.

Leguminosæ and Gramineæ grown separately and in mixture, with especial reference to utilization of nitrogen, F. PILZ (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 10, pp. 1150–1210; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 11–12, pp. 2484–2486*).—Peas and barley and oats and vetch were grown separately and combined, as indicated, in pot experiments, and these and corn and horse beans were grown in field experiments with and without applications of fertilizers.

The results obtained show that the yield of dry matter per unit of area was greater for the mixtures than the sum of yields of the crops grown separately, but was smaller as compared with the amount of seed used. The yield of dry matter was affected less by fertilizers in the case of mixtures than in the case of the separate crops. Leguminous plants grown in the mixtures were poorer while cereals were richer in nitrogen than in case of the crops grown separately. There was an increase in the nitrogen content of the leguminous crops only when these made poor growth and the soil contained a sufficient amount of nitrates. The increased nitrogen content of cereals grown with leguminous plants is attributed to the diminished growth of the cereals and

not to the presence of the leguminous plants. The lower nitrogen content of leguminous plants in the mixtures is attributed to their smaller growth. The fertilizers applied had more effect on the nitrogen content of the cereals than on that of the leguminous plants. The nitrogen production per unit area was greater with the mixtures than the sum of nitrogen production by the separate crops, but was influenced to a greater extent by fertilizers in case of separate crops than in mixtures.

The formation of calcium carbonate in the soil by bacteria, C. T. GIMINGHAM (*Jour. Agr. Sci., 4 (1911), No. 2, pp. 145–149*).—Continuing investigations by Hall and Miller (E. S. R., 17, p. 1048) which indicated that calcium salts of organic acids such as oxalic are oxidized to carbonate by the action of molds and bacteria, the author confirmed this conclusion and succeeded in isolating from Rothamsted and Wye soils 6 types of bacteria which were capable of converting calcium oxalate into carbonate. The rate of conversion varied with the different types and with different conditions of culture. The best results were obtained with a clear soil extract. The possibility of enzymic action was removed by treating the culture solutions with toluene or chloroform which completely prevented carbonate formation. The formation of carbonate was more rapid with mixed than with pure cultures, but it was impossible to secure any action with either under anaerobic conditions. The 6 types of bacteria isolated are not described.

Changes in the so-called physical properties of soils by freezing, heating, and the addition of salts, W. CZERMAK (*Landw. Vers. Stat., 76 (1912), No. 1–2, pp. 75–116*).—The author studied the hygroscopicity as determined by a modification of the Rodewald-Mitscherlich method (E. S. R., 15, p. 847) and the soluble nitrogen of (1) soils which had been alternately frozen and thawed, (2) soils which had been subjected for 2 hours in succession to steam under a pressure of from 1.5 to 2.5 atmospheres, and (3) soils to which calcium chlorid and aluminum sulphate had been added. Pot experiments were also made with soils so treated, as well as with those to which electrolytes—calcium and thorium chlorids—had been added; those fertilized with monopotassium phosphate and potassium and ammonium nitrates; and those treated with a 0.025 ampere current of electricity for 24 hours.

The modification of the Rodewald-Mitschelich method consisted in reversing the usual order of procedure, namely, starting with soils with their natural water content, bringing them to moisture equilibrium in a vacuum desiccator over 5, 7.5, and 10 per cent sulphuric acid, and finally determining the moisture content by drying over phosphorus pentoxid.

Freezing, heating, and the addition of electrolytes reduced the soil surface and consequently the hygroscopicity by coagulating the soil colloids. Coagulation of the soil colloids was increased by alternate freezing and thawing and by the length but not by the intensity of the freezing. Soil colloids, coagulated by freezing, absorbed a part of the nitrogen in the soil solution and thus reduced the amount readily available. Heating with steam under pressure frequently increased the solubility of the nitrogen as a result of purely chemical changes. The addition of calcium chlorid and aluminum sulphate reduced the hygroscopicity of soils, the reduction being more pronounced in the case of the former.

The results with pot experiments were inconclusive, the electrolytes—calcium and thorium chlorids—added proving toxic to the oat plants used in the experiments. The author concludes that pot experiments are not suited to the study of physical changes in soils.

The penetration of the soil by frost and its importance in relation to plant growth and soil culture, W. NAEGLER (*Wetter, 28 (1911), No. 9, pp. 210, 211*).—This is a brief compilation of information on this subject.

Aeration of the soil by earthworms, J. N. FRIEND (*Sci. Prog. Twentieth Cent., 6 (1912), No. 23, pp. 393–401, fig. 1*).—A study of the carbon dioxid exhalation of *Lumbricus rubellus, Allolobophora longa, Aporrectodea chlorotica, Octolasium cyaneum*, and Dendrobaena showed that the amount of carbon dioxid exhaled was not proportional to the body weight of the worms, but increased as the size of the worms decreased. It was practically the same as that of human beings in a similarly quiescent state. It increased with a rise in temperature and under the influence of daylight.

The ways in which the worms mechanically and chemically promote aeration in the soil are explained. It was found that the ferric oxid of the sand had been dissolved in the castings of the worms, suggesting that this may be an important factor in rendering plant food available.

The flow of water and air through soils, J. W. LEATHER (*Jour. Agr. Sci., 4 (1912), No. 3, pp. 303, 304*).—Referring to a previous article by Green and Ampt (E. S. R., 25, p. 620), it is pointed out that Poiseuille's formula is not applicable to soils.

Laboratory apparatus for the determination of the absolute water capacity and of the complete water capacity (also rate of percolation and of absorption) of soils, F. MARSHALL (*Landw. Vers. Stat., 76 (1912), No. 1–2, pp. 125–134, figs. 5*).—Special forms of apparatus for determining "the absolute water capacity," by means of the amount of water absorbed by capillarity, and "the complete water capacity," measured by the amount of water retained when the soil is saturated with water added at the surface, are described, and their use is explained as is the application of the data thus obtained in the calculation of the rate of percolation and of absorption of soils.

Tests of the method described on different mixtures of sand and clay showed that the rate of capillary rise of water decreased and the water capacity increased with the proportion of clay.

The author is of the opinion that, although laboratory determinations of the water capacity of the soil have no direct practical value since the soil in such cases is not in its natural state and conditions are abnormal, they may be useful in studying the relationships of different soil groups.

Investigations on the amount and composition of drainage water, M. GERLACH (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 2 (1910), No. 4, pp. 319–387, figs. 4; 3 (1911), No. 5, pp. 351–381; Illus. Landw. Ztg., 31 (1911), No. 80, pp. 755, 756; abs. in Zentbl. Agr. Chem., 39 (1910), No. 10, pp. 647–653; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 11–12, pp. 2469, 2470*).—Observations extending over several years on the amount and composition of field and lysimeter drainage waters as affected by such factors as precipitation, and the character of the soil, fertilizers, and cropping, are reported in considerable detail. See also a previous note (E. S. R., 24, p. 711).

Ten lysimeters 2 meters square, 1.2 meters deep, and containing 4 cubic meters of soil, were used. The construction of these lysimeters is fully described and illustrated. Five of the lysimeters were left without fertilizer and five were fertilized with calcium carbonate, ammonium sulphate, and dipotassium phosphate. The cropping was fallow the first year, followed in order during the four succeeding years by potatoes, oats, rye, oats. Five different kinds of soil, varying from moor soil to light, sandy loam, were used.

The total precipitation during the period of observation (1,540 days) was 2,236.2 mm., corresponding to 8,944.8 liters per lysimeter. The amount of drainage water obtained varied from 847.2 liters per lysimeter for fertilized moor soil to 2,720 liters for unfertilized humus sand. The amount of drainage was uniformly greater with unfertilized than with fertilized soils. The latter, therefore, evaporated more water, but this water was more economically utilized by crops as shown by the amount of water required to produce 1 kg. of dry matter, this varying from 359.4 kg. on fertilized moor soil to 1,149 kg. on unfertilized humus loam.

The drainage waters contained no phosphoric acid. There were, however, considerable losses of nitrogen, potash, and lime in the drainage waters, the losses of these constituents in the drainage water of the lysimeters being much larger than in that obtained from field drains. With one exception the nitrogen in the drainage water was greater and the potash was smaller in the unfertilized than in the fertilized soils. In all cases the drainage water of fertilized soils contained smaller amounts of lime than that of unfertilized soils. There was more drainage water and greater loss of plant food during fallow periods than during periods when the soils were growing crops.

Investigations on the influence of high ground water level on cultivated plants, J. KÜHN and U. GOLF (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1911, No. 20, pp. 113–153*).—Pot experiments conducted from 1902 to 1910, inclusive, to determine at what height the ground water level becomes injurious to plants, are reported, using winter rye, summer rye, oats barley, and potatoes as the experimental crops.

The results show that the best yields were obtained with permanent water levels between 60 and 80 cm. and with temporary or fluctuating water levels between 50 and 70 cm. Ground water levels which were permanently below 80 cm., or permanently or temporarily above 50 cm., reduced the yield of crops. The length of roots (potatoes) increased with the lowering of the water level. The root tips were as a rule either a few centimeters above or below the water level. The depth of penetration of the roots under temporary water levels varied considerably. Applying the water at the time of planting so that the water level stood at 80 cm., as compared with similar applications 2 weeks after germination, reduced the total and average yield of tubers, the weight and length of leaves, and to a less degree, the weight of roots.

Hardpan in Norway—in arid climate, K. O. BJÖRLYKKE (*Norsk Geol. Tidsskr., 2 (1911), No. 2, Art. 5, pp. 12, fig. 1*).—It is shown that while most of Norway is humid there are areas in the upper portions of the great eastern valleys where the annual rainfall is only from 300 to 500 mm. (11.8 to 19.7 in.), and where the climatic and soil conditions present many of the characteristics of arid regions. Samples of so-called saltpeter earth, high in water-soluble salts, from northern Gudbrandsdalen, and calcareous hardpan from northern Österdalen, are described.

First report of the Temir experiment field of the Turgai-Ural Colonization District, 1907–8, S. K. CHAÏANOV (*Izv. Peresel. Upravl., St. Peterb., 1910, pp. 166; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 2, pp. 204–207*).—This experiment field was established in 1907. The annual precipitation in 1908 was only 202 mm. (7.95 in.). Evaporation was very intense, amounting to 866.3 mm., or four times the annual precipitation. In July alone it amounted to 246.8 mm.

The minimum soil moisture was found at a depth of from 50 to 75 cm. The summer rains appeared to be without influence on the soil moisture except in the surface layers. Black (bare) fallow and April fallow on virgin soil contained 4.7 per cent of moisture at the time of sowing winter cereals, and May

fallow contained 2 per cent less moisture. June fallow contained as much moisture as the virgin soil, but in neither case was it available for plants. Depth of plowing had no effect upon the soil moisture. The yields of cereal crops during the first year on the virgin soils were very small.

Reports on investigation of the soils of Asiatic Russia, K. D. GLINKA ET AL. (*Trudy Pochv.-Botan, Eksped. Izslied. Kolon. Raĭnov Aziat. Ross. I, Pochv. Izslĕd., 1908; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), Nos. 2, pp. 209, 210, 211–214, 214–218, 219–222; 3, pp. 357–359*).—Abstracts are here given of soil investigations made by expeditions organized by the Colonization Administration of Russia in 1908, under the direction of the author.

Descriptions of soils of Asiatic Russia, N. V. BLAGOVĔSHCENSKIĬ and B. A. SKALOV *Mater. Izslĕd. Kolon. Raĭonov Aziat. Ross., 1910; abs. in Zhur.* SKALOV (*Mater. Izslied. Kolon. Raĭonov Aziat. Ross., 1910; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), Nos. 2, pp. 222, 223; 3, pp. 359–361*).—Abstracts are here given of reports of soil investigations made under the direction of K. D. Glinka by expeditions organized by the Colonization Administration of Russia in 1908.

Water and soils of the Neva drainage basin, A. A. INOSTRANTSEV (*Abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 2, p. 223*).—This is an abstract of a report of a study of the soils and of the spring, stream, and soil waters of this basin, as well as of the geological formations of the region.

Classification of Turkestan soils, K. D. GLINKA (*Pochvovĕdĕnie (Pédologie), 1910, No. 4; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 3, pp. 361–363*).—A classification based upon the character and arrangement of vertical soil zones is given.

A contribution to the question of the utilization of inferior sandy soils, J. KÜHN and H. BODE (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1911, No. 20, pp. 155–217, fig. 1*).—An account is given of experiments in building up a tract of land of the deforested belt of inferior sandy soils on the estate of the late Julius Kühn.

Experience showed that cutting the original forests destroyed the stand and that the soil was not suited to the production of cultivated crops. It was decided, therefore, to test the feasibility of improving these lands by growing legumes with an application of mineral fertilizers. The amounts of fertilizers applied never exceeded 53 lbs. of phosphoric acid, 71 lbs. of potash, 35 lbs. of nitrogen, and 534 lbs. of lime per acre. After several years, during which the legumes were grown extensively, the land produced profitable crops of rye and potatoes, and it was possible to maintain a number of dairy cows and sheep on the feed produced. An effort was made to grow broom corn in conjunction with other grasses for sheep pasture but without success. The soil, however, was believed to be in favorable condition for reforestation since much organic matter had been incorporated.

The report includes the results of mechanical and chemical analyses of a large number of samples of typical sandy forest soils and of the ashes of different parts of forest trees, made with a view of studying the proportion of plant food constituents in the soil and in the trees growing on it.

The results in general point to phosphoric acid as the limiting element of plant food in the growth of the trees.

Plant food in relation to soil fertility, C. G. HOPKINS (*Illinois Sta. Circ. 155, pp. 10*).—This is an address delivered at the Washington meeting of the American Association for the Advancement of Science. It answers affirmatively the question of whether the plant food applied increases plant yields in harmony with recognized soil deficiencies and crop requirements, and negatively the

question of whether the rotation of crops maintains the productive power of the soil by avoiding injury from possible toxic excreta from plant roots.

Plant food combinations for sundry crops, J. L. HILLS (*Vermont Sta. Circ. 7, pp. 14*).—This is a summary of the more important information originally published in Bulletin 116 of the station (E. S. R., 17, p. 230).

Experiments with lime nitrogen alone and mixed with lime niter, H. G. SÖDERBAUM (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 50, pp. 13, figs. 2; K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 8, pp. 701–710, figs. 2*).—In order to overcome the injurious effect of lime nitrogen on young plants, it has been suggested to use it in mixtures with lime nitrate. The author made pot experiments on oats with these materials separately and in mixtures of 1 and 2 parts of lime nitrogen to 1 of lime nitrate applied as top-dressing or thoroughly mixed with the soil before seeding, the soil in every case receiving a basal fertilizer supplying the necessary amounts of other fertilizing constituents.

When the materials were mixed with the soil before seeding, the lime nitrate was as effective as sodium nitrate in increasing the yield. Lime nitrogen also gave good results and produced a slightly greater yield of grain than sodium nitrate. No injurious effects from its use were observed. Mixtures of lime nitrogen and lime nitrate gave somewhat better results than either material separately. The best mixture appeared to be 2 parts of lime nitrogen to 1 part of lime nitrate. When applied as top-dressing the fertilizing effect of the 2 nitrates was appreciably increased. Lime nitrogen, however, applied as top-dressing proved injurious and in some cases killed the plants. The yields with lime nitrogen applied in this way were less than without nitrogen. A mixture of 1 part of lime nitrogen to 1 of lime nitrate was the least injurious, but even with this the increase in yield was very small.

The phosphate nutrition of plants, A. BAGULEY (*Jour. Agr. Sci., 4 (1912), No. 3, pp. 318–322, fig. 1; abs. in Jour. Soc. Chem. Indus., 31 (1912), No. 4, p. 195*).—Comparative tests of normal orthophosphates of calcium, iron, and aluminum were made with oats, peas, and Swedish turnips grown on artificial soils of sand and chalk.

Better results were, as a rule, obtained with iron and aluminum phosphates than with calcium phosphate or even with superphosphate. Experiments were also made with iron and calcium phosphates which had been ignited and extracted with boiling water. It was found that this treatment affected the availability of the phosphates to a considerable extent. The insoluble calcium phosphate was much less effective than iron phosphate in the case of oats, but there was little difference in the case of Swedish turnips and peas. These results are in accord with those of H. G. Söderbaum and D. N. Prianishnikov (E. S. R., 14, p. 434; 18, p. 539).

Fertilizing value of certain phosphates, H. G. SÖDERBAUM (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1912, No. 56, pp. 18, figs. 4; K. Landtbr. Akad. Handl. och. Tidskr., 51 (1912), No. 1, pp. 42–56, figs. 4*).—The relative value of Tunis phosphate, bone precipitate from a gelatin factory, so-called Palmaer phosphate (electrically precipitated dicalcium phosphate), artificial ferric phosphate, and so-called Bernard phosphate (calcined low grade Belgian raw phosphate) was tested in pot experiments with oats.

Taking the action of superphosphate as 100, the relative action of the Tunis phosphate was 22.2 and of bone precipitate from 111.2 to 116.6. Slowly precipitated dicalcium phosphate was somewhat less effective than the ordinary kind. The increase of yield produced by the ferric phosphate was at best only about one-fifth that produced by superphosphate. The Bernard phosphate was entirely without effect.

Soils on which phosphorite is effective, K. K. Gedroĭts (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 6, pp. 811–818, fig. 1*).—The experiments reported in this article were undertaken to ascertain the relation between the action of phosphorite and the degree of saturation of the mineral constituents of the soil.

In pot experiments it was found that the phosphorite was much more effective on a sandy loam soil which contained an excess of acidic over basic constituents than on a saturated light loam soil. It was found also that a productive chernozem soil which did not respond to applications of phosphorite in its natural condition was much benefited by applications of phosphorite after it had been subjected to the action of carbonated water, which materially reduced its basicity.

Phosphate lands withdrawn from entry (*U. S. Geol. Survey Press Bul., n. scr., 1912, No. 41, p. 1*).—It is stated that up to the end of January, 1912, there had been withdrawn from entry in Idaho a total of 1,167,137 acres of phosphate land; in Wyoming, 1,266,668 acres; in Utah, 107,745 acres; in Montana, 33,950 acres; and in Florida, 35,640 acres, making a total of 2,611,140 acres.

Potash-bearing rocks of the Leucite Hills, Sweetwater County, Wyoming, A. R. Schultz and W. Cross (*U. S. Geol. Survey Bul. 512, pp. 39, pl. 1, figs. 9*).—This bulletin "describes briefly the rocks in the Leucite Hills, Wyoming, and estimates the amount of leucite-bearing rock available and the approximate amount of potash that these rocks may yield as soon as a process is discovered by which the potash can be dissociated from the rock cheaply enough for commercial use." It is estimated that the available leucite-bearing rock in this region amounts to 1,973,000,000 tons, which, on a basis of 10 per cent of potash and 10 per cent of alumina, is capable of yielding 197,000,000 tons each of these materials.

The fertilizing action of common salt, H. G. Söderbaum (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 51, pp. 12; K. Landtbr. Akad. Handl. och. Tidskr., 51 (1912), No. 1, pp. 21–29*).—To determine whether the beneficial effect which has been observed in the use of common salt as a fertilizer for various crops is due to the sodium or to the chlorin which it furnishes, the author made pot experiments with oats in which sodium nitrate, ammonium chlorid, and ammonium sulphate were used as sources of nitrogen in combination with basal fertilizers supplying the necessary amounts of other fertilizing constituents. In certain cases the equivalent amounts of sodium furnished by the sodium nitrate were supplied in form of sodium chlorid.

In every case the addition of sodium chlorid appreciably increased the total yield whether it was used in connection with sodium nitrate or ammonium sulphate, but no such increase was observed when it was used in combination with ammonium chlorid. The author, therefore, concludes that the beneficial effect of the salt was due to its chlorin content rather than to the sodium which it supplied, particularly in view of the fact that the soil on which these experiments were made was poor in chlorin.

Bat guano in Mexico, A. V. Dye (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 41, p. 735*).—Brief reference is made to the bat guano deposits, found especially in different localities in the State of Sonora, the exportation of which through the port of Nogales during the fiscal year ended June 30, 1911, is stated to have been 1,893 tons valued at $28,432. The average ammonia content is from 12 to 15 per cent, sometimes running as high as 20 per cent. Guano containing less than 10 per cent ammonia is not accepted for export. A crude method of judging of the ammonia content of the guano by treating it with unslaked lime in water is described.

Utilization of sewage sludge for the production of illuminating gas and sulphate of ammonia (*Abs. in Engrais, 26 (1911), No. 42, p. 1165; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 11–12, pp. 2481, 2482*).—A process in use at Brünn, Moravia, in which sludge is subjected to dry distillation with the production of illuminating gas, coke, and sulphate of ammonia is described in this article.

It is stated that 100 kg. of dry sludge is capable of producing 23 cubic meters of good illuminating gas, 63 kg. of coke, and 0.75 kg. of ammonium sulphate. It is believed that the use of this process is profitable and will go a long way toward the solution of the sewage sludge problem.

Annual report on fertilizers, B. B. Ross (*Bul. Agr. Dept. Ala., 1911, No. 43, pp. 152*).—Analyses and valuations of fertilizers inspected in Alabama during the year ended July 31, 1911, are reported and discussed.

Fertilizers, R. E. Rose and L. Heimburger (*Fla. Quart. Bul. Dept. Agr., 22 (1912), No. 1, pp. 4, 5, 7–12, 23–33, 37, 38, 43–71*).—An account is given of the fertilizer inspection during 1911, including analyses of fertilizers examined, with notes on laws and regulations and valuation of fertilizers.

Commercial fertilizers and chemicals, T. G. Hudson, R. E. Stallings, et al. (*Bul. Ga. Dept. Agr. 1911, No. 54, pp. 264*).—This bulletin gives the state laws affecting the manufacture and sale of fertilizers in Georgia, including the law approved August 22, 1911, as well as the regulations prescribed by the commissioner of agriculture under the laws, fertilizer formulas for the principal crops grown in the State, and analyses and valuations of 5,610 samples of commercial fertilizers inspected during the season 1910–11.

Inspection of fertilizers for 1911, B. E. Curry and T. O. Smith (*New Hampshire Sta. Bul. 155, pp. 3–9*).—Actual and guarantied analyses of 113 samples of fertilizers examined during the year are reported. It is stated that "the fertilizers in general met their guaranty." The effort of manufacturers to induce their patrons to use the better grades of fertilizers is commended.

AGRICULTURAL BOTANY.

Absorption and excretion of salts by roots, as influenced by concentration and composition of culture solutions, I.—Concentration relations of dilute solutions of sodium and magnesium nitrates to pea roots, R. H. True and H. H. Bartlett (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 231, pp. 36, pl. 1, figs. 21*).—This bulletin reports the results of a series of experiments with field peas grown in solutions of calcium and magnesium nitrates in various dilutions.

The authors found "(1) that there is a definite concentration for each salt or mixture of salts at which the roots of peas absorb and excrete electrolytes at the same rate; (2) that if a culture solution is initially less concentrated than this equilibrium concentration, excretion from the roots overbalance absorption; (3) that if a solution is initially more concentrated than this equilibrium, absorption overbalances excretion; (4) that absorption from solutions initially above equilibrium concentration may carry them far below this concentration; (5) that the extent to which pea roots can carry the concentration of a solution below equilibrium concentration depends upon the ratio of magnesium to calcium; (6) that the molecular ratio which favors maximum absorption is 1:1; (7) that the ratio of magnesium to calcium which insures good development of pea roots is 9:1, if the solutions are so concentrated that their magnesium content alone would inhibit the development of lateral roots; but (8) that this ratio is nearer 99:1 if the solutions are so dilute that the magnesium content alone would not inhibit the development of lateral roots."

The rôle of nitrates in the nutrition of plants, E. GODLEWSKI (*Rev. Sci. [Paris], 49 (1911), II, No. 6, p. 178*).—A note is given of investigations carried on by the author in which wheat seedlings were placed in light and darkness and grown in the absence of carbon dioxid in order to exclude the ordinary phenomena of photosynthesis. One lot of the plants received calcium nitrate and other mineral salts, while the others received the same mineral salts but without any nitrogen.

The plants which did not receive nitrogen lost a portion of their original nitrogen, while those which had been given nitrates absorbed a considerable proportion of the salt, forming nitrogenous compounds, and this took place in darkness as well as in the light. The amid nitrogen was found to increase much more abundantly in the plants which received nitrates than in those not receiving these salts. The amids appear, therefore, not only as degradation products of albuminoids, but also in the synthetic processes in the utilization of nitrates.

In the utilization of nitrogen by plants, the author states that there are two stages, one which consists of a change from the nitric form to an amid form, and the second where the amids are transformed into proteids. This stage is little understood, but it was found not to take place except in the light, indicating that light is essential to albuminoid formation in plants.

The utilization of cellobiose as a source of energy in nitrogen fixation through bacteria, A. KOCH and S. SEYDEL (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 23–25, pp. 567–570*).—Continuing investigations on nitrogen gain and loss in soils (E. S. R., 23, pp. 122, 123, 429; 24, p. 140), the authors experimented with solutions of cellobiose on agar, employing cultures of nitrogen-fixing bacteria, both pure and mixed with other bacteria from the soil.

In the case of the first there was no fixation of nitrogen, while in the latter such fixation occurred. From this it appears, and is confirmed by later experiments, that cellobiose is employed as a source of energy in nitrogen fixation, not by the nitrogen bacteria directly, but after its being changed by the agency of other bacteria, probably assisted in this case by the hydrolizing action of *Aspergillus niger*.

Investigations on the progress and economy of nitrogen fixation, A. KOCH and S. SEYDEL (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 23–25, pp. 570–577*).—Continuing the above studies on nitrogen fixation, the authors here undertook to decide whether bacteria in taking nitrogen from the air employ all of the energy used therewith, as, for example, that from the sugars, in building up their own cell structures, or turn some of the supply to other processes, as the building of reserve materials. With dextrose as a main source of energy the authors carried out experiments for various periods of time, and then analyzed the results for each period and calculated the number of milligrams of nitrogen fixed per gram of dextrose used therein.

Two facts were brought out, viz, (1) that as the experiment goes forward and the increase of bacteria is checked the fixation of nitrogen per unit of dextrose used decreases (presumably because the energy is turned to other purposes), and (2) the cases of most rapidly increasing fixation show also the highest rate of fixation per unit of the energy used, due probably to the very rapid increase of bacteria.

It is believed that the results point to a more rational and cheaper process of nitrogen fixation in agricultural practice, as soon as a means may be found to compel the bacteria to go on increasing at the rapid rate observed in the earlier stages of the experiment, thus maintaining the high and profitable rate of nitrogen fixation with the energy-giving material used.

Investigations on the assimilation of carbohydrates by Beta vulgaris, W. RUHLAND (*Jahrb. Wiss. Bot.* [*Pringsheim*], *50* (*1911*), *No. 2, pp. 200–257*).—The author studied the movements and storing of the principal carbohydrates in a variety of sugar beet, confining attention chiefly to cane and invert sugar. The results of this work may be summarized as follows:

Sugar moves in these plants not principally as cane sugar, according to the generally accepted view of Czapek, but as invert sugar, perhaps especially as fruit sugar, toward the roots, there to be condensed to cane sugar. Both invert and cane sugar are found moving from the leaves toward the roots, but the only conversion that takes place in the roots is of invert to cane sugar. In the second period of vegetation the cane sugar only is found to move in the roots, and this is broken up only on entrance into the leaves. In the axes of the flower-bearing twigs the cane sugar probably travels upward to be inverted in the young flowers. The cells of the leaves and petioles are permeable for raffinose, cane sugar, maltose, and more or less, for all the hexoses tested, out of which they are able to construct starch. The degree of permeability as determined by the plasmolytic method is exceedingly small for cane and invert sugar, and much greater for glucose and fructose. On the other hand, regulatory changes in permeability may be discoverable. The cells of the roots show still less permeability for raffinose, cane sugar, and maltose than do the cells of the foliage.

The exosmosis of the fully grown roots was carefully studied. Cane sugar is given out chiefly in opposition to the well-known earlier conclusions of Puriewitsch. The sieve tubes are not more permeable for sugar than the other cells, and can hardly play any particular part in sugar movement. Invertase in the sugar beet is soluble in water and occurs persistently in all parts of the plant except the seeds and full-grown roots. The roots of the very young seedlings also contain invert sugar. Growing roots rapidly lose their capacity for invertase, which is confined to the younger portions not only in the first period of growth, but in the second also. A regulatory manufacture of invertase takes place following the stimulus of an injury. The intramolecular respiration observed by Stoklasa as a result of which cane sugar is converted appears to show that this activity takes place only on traumatic stimulation. Invert sugar is not localized in particular cells separated from cane sugar. Considering the behavior of the cell contents it does not appear that cane sugar is inverted by an enzym in the cell sap, or in its surrounding water, but in the plasma itself.

Physiological behavior of enzyms and carbohydrate transformations in after-ripening of the potato tuber, C. O. APPLEMAN (*Bot. Gaz., 52* (*1911*), *No. 4, pp. 306–315*).—A report is given of changes observed during the apparent dormancy of potato tubers, the investigations indicating that the process of after-ripening is metabolic in character. In the investigations, studies were made of the potato tuber in storage at 0° C.

It was found that internal changes in the tubers are accelerated by a temperature of 0°. Both glucose and sucrose accumulate, the sucrose increasing at first more rapidly than the glucose, but at the end of 6 weeks of storage the percentage of glucose was about twice that of sucrose. The diastatic activity was greater in cold storage tubers than in those stored at room temperature at the end of 2 to 4 weeks, but there was no appreciable difference after an interval of 6 weeks. Catalase was found very abundant in potato tubers stored either at 0° or at room temperatures, but it suffered a gradual reduction as the storage at 0° continued. The presence of free acids would probably cause this reduction, and it is believed that the behavior of catalase corresponds with that of respiration. This is held to be significant in view of recent

claims that catalase is the primary factor in alcoholic fermentation, and therefore probably in respiration.

In conclusion the author states that the changes peculiar to the after-ripening of the potato tuber may be brought about by changes in the bud and not in the tuber as a whole.

On the influence of fermentation products and phosphates upon respiration in plants, S. KOSTYTSCHEW and A. SCHELOUMOW (*Jahrb. Wiss. Bot.* [*Pringsheim*], *50* (*1911*), *No. 2, pp. 157–199*).—The authors state that they expect to throw light upon the relations between the carbon dioxid exhalation of plants and alcoholic fermentation, and thereby upon the mechanism of respiration in general, studying the problem in the light of the discovery (according to recent conclusions) that not acid exhalation alone but alcoholic fermentation as well depends upon the influence of the phosphates. The article, besides giving details of the authors' researches, attempts (1) to state briefly the known pertinent facts, (2) to separate the experimentally based from the hypothetical views, and (3) to render judgment as to the plausibility of the latter.

Experiments were carried out in the evolution of carbon dioxid by wheat embryos in solutions of phosphates, hydrates, grape sugar, and fermentation products. The principal conclusions arrived at may be summarized as follows: (1) The operation of the phosphates upon carbon dioxid production is essentially the acceleration of carbon dioxid formation through an alkaline reaction. (2) In neutral solutions phosphate ions have only a very small stimulating effect which expresses itself only in dilute solutions; even 3 per cent solutions have very slight influence. (3) The stimulating influence of alkaline reactions on carbon dioxid production occurs without an addition of phosphate, but that of the phosphate is greater. (4) Fermentation products give a surprising increase of carbon dioxid production when added to phosphate solutions. (5) Sugar solutions treated for 5 hours with ferments show a greater influence on carbon dioxid production than fermentation extracts alone.

The relation of transpiration and stomatal movements to the water content of the leaves of Fouquieria splendens, F. E. LLOYD (*Plant World, 15* (*1912*), *No. 1, pp. 1–14, dgm. 1*).—In continuation of a previous report (E. S. R., 25, p. 124), an account is given of comparative volumetric and gravimetric observations which show that in Fouquieria the ratio between intake and outgo of water is not constant, but that the outgo during the day is greater than the intake. The reverse condition obtains during the night. The decrease of water in the leaf occurs during the opening of the stomata. These organs are not closely regulatory of the water loss from the leaf and are ineffectual in maintaining a constant water content. It appears that transpiration, therefore, at times may be too great, and that stomata do not serve to reduce it by closing movements; they may, however, limit it in a passive manner.

Observations on the degree of stomatal movement in certain plants, B. E. LIVINGSTON and A. H. ESTABROOK (*Bul. Torrey Bot. Club, 39* (*1912*), *No. 1, pp. 15–22*).—A study was made to determine the opening and closing of stomata in a large number of plants at various periods of the day. The plants used were *Funkia ovata, Isatis tinctoria, Allium cepa, Eichhornia speciosa,* and *Œnothera biennis.*

It was found that all the stomata were open at the daylight hour of observation while the majority were closed at night. The diffusive capacity of the stomata appears to be approximately 8.2 per cent as great at about midnight as at 3 o'clock in the afternoon.

Experiments were conducted to determine the diffusive capacities of the stomata of the different leaves. This capacity reached the zero point at night in all cases excepting with Allium, Eichhornia, and the lower leaf surface of

Œnothera. Eichhornia possessed the largest daylight openings, followed by Allium and Œnothera.

A comparison of the amount and rate of stomatal closure, as exhibited by the 2 sides of the leaf, indicates that the upper stomata close and open more rapidly, or close more completely, than do the lower, although this difference is not pronounced in Eichhornia.

The respiration of fungi, A. MAIGE (*Bul. Soc. Hist. Nat. Afrique Nord, 1909, No. 2, pp. 29–31*).—From observations made upon a number of the fleshy fungi, the author concludes that respiration is much more active in the reproductive than in the vegetative portion of the fungus. This is particularly true of *Armillaria mellea*, in which the respiration of the cap was 3 times as great as that of the stalk.

The comparative influence of some organic substances on respiration, A. MAIGE and G. NICOLAS (*Bul. Soc. Hist. Nat. Afrique Nord, 1910, No. 5, pp. 71–81*).—The effect of saccharose, lactose, and glycerin on the respiration of etiolated shoots of beans was investigated. It was found that in general the influence of organic substances on the respiration of plants depends on 3 factors, the ability to penetrate to the interior of the cells, the retardation of cellular growth due to osmotic pressure, and the specific quality of the different substances.

The variation in the respiration of plants in proportion to age, G. NICOLAS (*Bul. Soc. Hist. Nat. Afrique Nord, 1910, No. 7, pp. 109–112*).—A study of young and adult leaves of about 20 species of plants was made, and it was found that the young leaves presented in comparison to those fully developed a greater respiratory energy and a higher respiratory quotient. This difference in the respiration to a large degree is due to the greater ease of penetration of the gas to the young leaves.

The wilting coefficient for different plants and its indirect determination, L. J. BRIGGS and H. L. SHANTZ (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 230, pp. 83, pls. 2, figs. 9; Bot. Gaz., 53 (1912), No. 1, pp. 20–37; abs. in Science, n. ser., 35 (1912), No. 891, pp. 158, 159*).—A study was made to determine whether the wilting coefficient of a soil could be computed from physical measurements of its moisture retentivity. The experiments reported were conducted with a variety of plants, in which a comparison of the wilting coefficient was made with the moisture equivalent, the hygroscopic coefficient, the moisture-holding capacity, and the mechanical analysis, for a series of soils ranging from pure sand to clay.

From this comparison a series of relationships was established which form a means of computing the wilting coefficients when direct determinations are not feasible. The authors found that the wilting coefficient was equal to $\frac{\text{moisture equivalent}}{1.84\,(1\pm0.007)}$; $\frac{\text{hygroscopic coefficient}}{0.68\,(1\pm0.018)}$; $\frac{\text{moisture-holding capacity}-21}{2.90\,(1\pm0.021)}$; or $\frac{0.01\text{ sand} + 0.12\text{ silt} + 0.57\text{ clay}}{(1\pm0.025)}$. The second term of the quantity within the parenthesis is believed to show the probable error of the relationship in each case.

On page 77 in the bulletin the last formula for wilting coefficient should have the signs in the numerator plus (+) instead of minus (—).

A study of summer evaporation and plant distribution, B. E. LIVINGSTON (*Plant World, 14 (1911), No. 9, pp. 205–222, figs. 3*).—The results are given of a study of the evaporation from porous cup atmometers at 38 stations in the United States and Canada, covering a period of 15 weeks during the summer. The author claims that the summer evaporation intensity furnishes a climatic criterion for studying the different vegetation centers, and that the results of

such a study are as promising as those furnished by a study of any other meteorological element.

Biological researches on protective contents of plants, W. PEYER (*Flora, n. ser., 3 (1911), No. 4, pp. 441–478*).—This is a report on certain properties of plants studied in relation to their protection against animals. These protective properties are apparently either chemical or mechanical, and are objectionable probably because of taste, smell, structure (hairy or crystalline), etc., or perhaps on account of some subtler effect which suggests their hurtful or deadly nature, as in the case of poisons.

Details are given and tabulated, with effects observed on animals eating objectionable plants after 24 hours of hunger, etc. The needle-like crystals of oxalate of lime are found in many plant cells. These are mechanically offensive to mucous membranes, more so than broken glass, coal splinters, copper filings, or fish bones, besides which by wounding surfaces they give quicker circulation to poisons, etc. This makes their presence a peculiarly effective form of protection. The same is true in a less degree of other common crystals.

Literature of tropical economic botany and agriculture, 1899–1910, I, II, J. C. WILLIS ([*Ceylon: Roy. Bot. Gard.*], *pts. 1, pp. 62; 2, pp. 45*).—This is a list of the more important articles that have appeared in books, journals, and other publications relating to tropical plants of economic importance.

Seeds and plants imported during the period from January 1 to March 31, 1911—Inventory No. 26 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 233, pp. 98*).—A list is given of 1,134 seeds and plants which were introduced during the period indicated above. These represent miscellaneous collections. A considerable portion, however, was secured by Mr. F. N. Meyer in Asia.

FIELD CROPS.

Guide to experiments for 1911, D. A. GILCHRIST (*County Northumb. Ed. Com. Bul. 16, pp. 5–73, figs. 2*).—This reports a continuation of work at Cockle Park, previously noted (E. S. R., 24, p. 34).

In view of the results of fertilizer experiments on meadows, pastures, and various rotations, the author concludes "that dung is of considerably more value than artificials for this light soil, but both give satisfactory results." The use of dung alone was followed by practically as heavy crops of roots as when artificial fertilizers also were used, but the residual effect upon the 3 following crops was greater in the case of the mixture. In rotations the best results followed the use of dung only for swedes and a complete mixture of commercial fertilizers on the hay crop. A division of the total amount of fertilizer over 3 hay crops in the rotation did not prove advantageous. "Linseed cake fed to sheep when eating off the roots has greatly increased the following corn crop, but the subsequent crop to a small extent only." "Sulphate of ammonia has had distinctly exhausting results except on the crops to which it was applied." In the absence of a potash source almost no gains were obtained from artificial fertilizers, but a moderate application of dung did much to remedy this deficiency on this light soil.

A table states the results of a variety test of oats conducted during the period 1906–1910 inclusive. In 1910, 10 varieties were tested, the highest yield being produced by Payrent which yielded 65½ bu. of 42 lbs. each per acre. In a test of varieties introduced from Canada, Thousand Dollar yielded 57¾ bu. and Banner 56½ bu. Both varieties gave from 13 to 15 bu. more per acre when brought directly from Canada than after they had grown at Cockle Park for some years. In a test of 6 barley varieties the highest yield in 1910 was pro-

duced by Maltster. Among 4 wheat varieties the highest yield of good grain in 1910 was produced by Scholey Squarehead.

In a test of dung, slag, muriate of potash, superphosphate, and lime mud, singly and in various mixtures and amounts, the highest yields of beans followed applications of (1) 10 tons dung, 6 cwt. slag, and 1 cwt. muriate of potash, and (2) 6 cwt. slag and 1 cwt. muriate of potash. Every application tested was followed by at least 1½ times as great a yield as was secured from the check plat.

In a fertilizer test with mangels on a loam soil with a mixed clay and sandstone subsoil, the results showed a considerable advantage of nitrate of soda over sulphate of ammonia, of slag over superphosphate, and of sulphate of potash over muriate of potash. A considerable advantage followed the use of common salt. It appeared "that complete artificials should be used with dung for this crop, the loss being greatest when nitrogen is withheld." Two tons of lime per acre appeared to decrease the quantity of mangels during the 3 years following its application, while 4 tons of lime mud apparently reduced the yield about 4½ tons per acre.

Applications of 128 lbs. of lime nitrogen and 112 lbs. of sulphate of ammonia to oats were followed by yields of 71½ and 72½ bu. of good grain per acre, respectively, as compared with 69½ bu. after the use of 140 lbs. of nitrate of soda and 57½ bu. per acre on the check plat. In another test applications of 112 lbs. of nitrate of soda and 134 lbs. of nitrate of lime were followed by yields of 38 and 46¾ bu. of oats respectively as compared with 31 bu. secured from the check plat. In an experiment on clay loam soils applications of 112 lbs. of nitrate of soda and 134 lbs. of nitrate of lime were followed by yields of 43 and 43½ bu. of oats per acre, respectively, as compared with 38¾ bu. after 87 lbs. of sulphate of ammonia, 32¾ bu. after 87 lbs. of nitrolim, and 34 bu. on the check plat. In a test at still another point applications of 112 lbs. nitrate of soda, and 134 lbs. nitrate of lime were followed by hay yields of 44½ and 46¾ cwt. per acre, respectively, as compared with 47½ cwt. after an application of 87 lbs. of sulphate of ammonia and 36¼ cwt. on the check plat. In a test of applications supplying 80 lbs. of nitrogen per acre to mangels the yields following nitrate of soda and nitrate of lime were 37 tons 4½ cwt. and 37 tons 4 cwt. respectively, as compared with 29 tons 4 cwt. and 31 tons 2 cwt. respectively after the use of nitrolime and sulphate of ammonia. One-third of the nitrate of soda and nitrate of lime was supplied at time of sowing and the remainder in 2 equal top-dressings.

Other experimental work on which notes or brief reports are presented include flax growing, tests of various grass and clover seeds and seed mixtures, a new scheme for fertilizing mangels, a fertilizer test with cabbage, variety, tests of swedes, turnips, and potatoes, and studies of the effect of applications of lime upon the finger-and-toe disease of swedes.

Report on the Cawnpore Agricultural Station in the United Provinces for the years ended June 30, 1910 and 1911, B. C. Burt (*Rpt. Cawnpore [India] Agr. Sta., 1911, pp. 1–43*).—Tables state in detail the data secured in rotation and fertilizer tests of corn and wheat.

In a test of calcium nitrate and calcium cyanamid as fertilizers for wheat in 1909 applications of the 2 fertilizers at the rate of 25 lbs. of nitrogen per acre were followed by yields of 1,628 and 1,543 lbs. of grain per acre, respectively, as compared with an average yield of 1,403 lbs. on the unfertilized plat. In 1910 the figures were 1,505, 1,480, and 1,075 lbs., respectively, and in 1911, 1,800, 1,843, and 1,695 lbs. A test of nitrate of lime as a poppy fertilizer showed a marked increase but was discontinued because of the rapid reduction in opium cultivation.

In a test of neem cake, night soil, and cotton refuse applied at the rate of 200 lbs. of nitrogen per acre, the highest average yield of potatoes during 1904–1909 followed the use of neem cake. Each was followed by a yield more than twice as great as that secured on the unfertilized plat. During 1910–1911 the plats were unfertilized and the residual value of these applications was tested. In 1910 the greatest yield was obtained from the neem cake plat but in 1911 this plat produced the lowest yield, much the highest being secured from the cotton refuse plat. Sugar refuse or filter press mud also applied at the rate of 200 lbs. of nitrogen per acre did not compare favorably with any of these fertilizers for potato growing. During 2 years' work cottonseed cake appeared to be a valuable fertilizer for potatoes but was surpassed in 1910–11 by both karanj cake and neem cake. In another experiment sugar refuse applied at the rate of 50 lbs. of nitrogen per acre was followed by a considerably greater yield of wheat than when applied at the rate of 100 lbs. of nitrogen per acre.

Tables state the results of variety tests of peanuts and wheat, and of date of planting tests of pigeon pea varieties sown mixed with sorghum.

Report on the operations of the department of agriculture, Punjab, for the year ended June 30, 1911, W. S. HAMILTON ET AL. (*Rpt. Dept. Agr. Punjab, 1910–11, pp. II+2+2+5+XXXVII*).—The author gives brief notes and tabular data on fertilizer tests with corn and sugar cane, which included the use of calcium nitrate, subsoiling and variety tests with sugar cane and wheat, tests of calcium nitrate as a wheat fertilizer and its residual value, green manuring with hemp, fertilizer and rotation tests with cotton and fodder crops, and the water requirements of various cotton varieties.

Report on the agricultural station, Orai, Jalaun, of the United Provinces of Agra and Oudh for the years ended June 30, 1910 and 1911, B. C. BURT (*Rpt. Agr. Sta. Orai, Jalaun [India], 1911, pp. 1–12, pls. 5*).—In a test of varieties the large Virginia peanut produced the highest 4-year average yield. Variety tests were also conducted with cotton, sorghum, wheat, pigeon peas, and gram. Fertilizer and rotation tests on various soils are reported.

Feeding crops and live stock experiments in South Africa, E. R. SAWER (*Cedara Memoirs on South African Agriculture. Pietermaritzburg: Govt., 1911, vol. 2, pp. 373+XXIV, pls. 20*).—Volume 1 of these memoirs has already been noted (E. S. R., 23, pp. 22, 31).

In this volume discussions of the principles of live stock feeding and of crop rotations are followed by detailed statement of the results of fertilizer and variety tests with turnips, swedes, mangels, carrots, sugar beets, chicory, alfalfa, vetch, lentils, sweet clover, lupines, sainfoin, clover, cowpeas, velvet beans, soy beans, peanuts, peas, Lima or Kafir beans, beans, horse beans, potatoes, cabbage, kale, rape, kohl-rabi, mustard, chard, sorghum, and prickly comfrey. In the case of the potato the experiments reported deal also with rate and time of planting, size of sets, disease resistance, irrigation, and the control of diseases and insect pests. Notes on the botanical and chemical composition of the veld herbage are followed by statements of the results of fertilizer experiments with grasses. The author also summarizes other available data.

[Field crops experiments in South Australia], A. E. V. RICHARDSON (*Rpt. Min. Agr. So. Aust., 1909–10, pp. 19–25*).—In fertilizer tests with wheat the highest yields followed applications of (1) 1 cwt. mineral superphosphate, ½ cwt. sulphate of potash, and ½ cwt. nitrate of soda, and (2) 1 cwt. mineral superphosphate and 5 cwt. lime per acre. Soil which was disked, plowed 6 in. deep, and thoroughly surface cultivated during the summer but not subpacked, produced 1 bu. more than that which was subpacked before sowing, but almost

4 bu. less than that which was similarly treated except that it was subpacked immediately after plowing. Three other plats similarly treated but plowed only 4 in. deep produced much smaller yields.

Other work reported includes tests of wheat varieties and hybrids and alfalfa varieties.

Forage experiments in Southern District, H. Ross (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 876–878*).—In a test of the forage-producing power of different plants Early Leaming corn was excelled only by Early Amber sorghum.

North Coast experiments, G. Marks (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 869–872*).—The results of fertilizer tests on corn and of tests of the forage yields of different varieties of corn, sorghum, millet, and cowpeas are reported.

[Variety tests], G. de S. Baylis (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 5, pp. 378–385*).—Tables or brief notes state the results of variety tests of wheat, oats, barley, and peas, and of tests of fertilizer mixtures and of mixed forage crops.

Field manuring experiments (*Agr. Students' Gaz., n. ser., 15 (1911), No. 5, pp. 141, 142*).—These pages report the results of fertilizer tests with swedes, mangels, and oats in 7 localities in Gloucestershire.

Alfalfa, L. R. Waldron (*North Dakota Sta. Bul. 95, pp. 355–424, figs. 15*).—This bulletin consists of two parts.

I. *Practical information for alfalfa growers.*—This is a digest of information relating to alfalfa production and utilization in North Dakota. The results reported in a number of experiment station and other publications already noted are briefly summarized. A bibliography of 12 titles is given.

II. *Alfalfa studies made at Dickinson; particularly drought resistance, water requirements and seed production.*—This paper reports the results of experiments conducted for the purpose of determining what constitutes a proper stand of alfalfa under the climatic conditions of North Dakota.

Seeding at the rate of 10 lbs. per acre apparently gave too thick a stand, while stands much thinner than are usually regarded as normal gave very satisfactory yields. Plants from thin stands had much better developed root systems than those grown in thick stands. A table states the hay yields secured during 1909–10 in a test of 18 varieties or strains of alfalfa, but the author regards the data as "of little value in showing the comparative yields of the various strains" because variations in stand, root development, and inoculation were great enough to offset difference in yield.

Studies in drought resistance may be summarized by the following table:

Alfalfa yields and quality of hay from definite distance transplant plats, 1910.

Spacing.	Plants per sq. yd.	Pounds per acre by cutting.				Character of third cutting.	
		First.	Second.	Third.	Total.	Leaves.	Stems.
In.						*Per cent.*	*Per cent.*
8 by 8	20.3	2,296	933	494	3,723	56.7	43.3
16 by 16	5.0	3,026	1,169	579	4,774		
24 by 24	2.3	2,382	1,180	612	4,174	57.0	43.0
36 by 36	1.0	1,888	944	632	3,464	53.4	46.6

The roots of the plants from these plats had a better development than the roots of the plants from the field. Photographs show that some at least of these transplanted plats had many roots acting as tap-roots but that they were rather small and did not go down to a great depth.

Brief accounts are given of what were to the author unexpectedly good results from thin seeding, self-seeding, and the plowing under of stands that were apparent failures. Alfalfa apparently well plowed under in the spring of 1908 produced 2 cuttings from the plants which survived and made a third growth which had bloomed and attained a height of from 15 to 20 in. by the latter part of September.

A table states the soil moisture content found in successive feet of soil for plats of alfalfa that had been sown broadcast or in rows and in some instances cultivated. Samples were taken to depths ranging from 10 to 18 ft. In general the moisture content was higher in the soil where alfalfa grew in cultivated rows, or where the stand was thin. Under a thick stand "the moisture was so depleted that growth could not take place, the growth of the plants being further hampered by the diminished root system."

The moisture content in each of the upper 6 ft. of the soil of a plat on which the alfalfa was planted in 6-in. rows and left uncultivated and of another plat on which it was cultivated in 30-in. rows showed an average moisture content for the uncultivated plat of 16.68 per cent April 1 and 9.52 per cent June 24, as compared with 15.45 and 12.70 respectively on the cultivated plat. This corresponded to a saving of 3.88 in. of water on the cultivated plat.

The average seed yield per plant obtained from 264 Turkestan plants was 13.6 gm. as compared with 14.5 gm. in case of 19 selfed plants and 22 gm. secured from 754 plants other than Turkestan. In 1910 a good yield of seed was secured from second growth alfalfa as compared with a failure on another portion of the same plat on which the first growth was left for seed. Alfalfa cultivated in 3 ft. rows, however, gave a yield of 109 lbs. of seed per acre during the same year.

Under a cage containing bumblebees 83 per cent of the 437 flowers in bloom were found to be tripped as compared with 91 per cent under a cage containing wild bees and wasps. No flowers were found tripped under the control cage or under a cage containing moths and butterflies.

Report of alfalfa specialist, P. K. Blinn (*Colorado Sta. Rpt. 1910, pp. 76–78*).—The year's work on the alfalfa breeding project has been along two lines, (1) a search for traits desirable for perpetuation, and (2) an investigation of the factors that influence the setting of alfalfa seed.

There seems to be a direct relation between the stooling habits of an alfalfa plant and its tendency to winterkill. "The type of plant with the deep crowning habit that sends out root stalks beneath the surface of the soil, with the bud areas protected with earth, characterizes the nonwinterkilling strains, while the plant that has a small stool that throws out its shoots almost upright at, or very near the surface, has its bud areas exposed and is therefore easily winterkilled."

The Baltic variety, which originated as a strain at Baltic, S. Dak., a little more than 10 years ago, showed marked resistance to a bacterial disease which seriously injured 9 other varieties growing under the same conditions. The disease seemed to be associated with frost injuries. In a variety test Baltic yielded 5,702 lbs. of hay per acre as compared with 4,126 lbs. or less from other varieties.

Notes regarding the yield of alfalfa, E. H. Jenkins (*Connecticut State Sta. Rpt. 1911, pt. 3, pp. 237, 256–258*).—The author states that a sufficient number of successes on a considerable scale have now been attained to prove that under proper conditions alfalfa can be successfully grown in Connecticut.

A measured acre from an 80-acre field yielded 5,542 lbs. at the first cutting, 1,663 lbs. at the second, and 2,420 lbs. at the third. Proximate analyses indicated that the first cutting, which was more mature, contained a lower per-

centage of protein and a higher percentage of fiber in the water-free substance than the later cuttings.

On November 5, 1911, after abundant fall rains, alfalfa soil and potato soil had 20.49 and 18.06 per cent of moisture in the surface 6 in. and 18.72 and 15.94 per cent, respectively, in the next 6 in. of soil. Each had 0.251 per cent of nitrogen in the surface soil, but the alfalfa land had a somewhat higher percentage of nitrogen in the subsoil.

Trials of imported lucern seed, E. BARING ET AL. (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 898–909*).—Notes and tables present data secured in tests on a number of experimental farms of seed of a considerable number of varieties of alfalfa grown in America.

Crossbreeding corn, C. P. HARTLEY ET AL. (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 218, pp. 72, fig. 1*).—This bulletin states the results obtained in 1909–10 in field tests at various points in California, Georgia, Maryland, and Texas in such a way as to show the relative productiveness of first generation crosses and their parent varieties. Nineteen tables state numerical data obtained in growing numerous varieties and crosses. From the data presented the authors draw the conclusions which follow:

Frequently intermediacy was observed in such characters as productiveness, height of stalk, length of growing season, and moisture percentage, although the varieties used were those locally popular, and therefore not radically different in their characters. Consequently, intermediacy was not as apparent as in these of a cross of very unlike parents. Since exceptions in one direction are offset by those in the other direction, the averages of many crosses usually indicate intermediacy, but in so few instances did the first-generation crosses average less in yield than the 2 parents that the authors believe that "the average productiveness of first-generation corn crosses is usually above the average of the parents." Reports of other tests of this nature have also indicated that these first-generation crosses excel in yield the average of the parents, but the authors regard it as uncertain how far these results have been affected by differences in the age and vitality of seed or the factors of adaptation, selection, and environment. "If further tests should show that with all conditions equalized there still exists a tendency for first-generation crosses to produce better than the average of the 2 parents, it might be taken as an indication that the higher yielding parent is usually prepotent."

Just as somewhat variable results followed the crossing of varieties, variations were also observed in crossings of different ears within the same variety, and different ears from different varieties. Just as some varieties nick well and others do not, individual plants also give variable results. "This shows the results obtained by crossing 2 varieties without reference to individual plants to be but an average of the results that would be obtained by crossing many individual plants of those varieties."

It is noted that the most profitable varieties for given localities will often be varieties that have not been crossbred or mixed with other varieties for many years, and their merits are doubtless largely the results of selection, acclimatization, and adaptation. The determination of the particular first-generation crosses best suited to a given locality is attended by many complexities. Careful tests are necessary before the local grower can be intelligently advised whether to continue planting a pure-bred strain, or to use a first-generation cross of certain strains.

Maize at Grafton Experiment Farm, A. H. HAYWOOD (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 889–897, pls. 4, figs. 6*).—A full statement of the methods used is followed by notes on the corn varieties tested.

Studies of Egyptian cotton, W. L. Balls (*Yearbook Khediv. Agr. Soc. Cairo, 1909, pp. 1–147, figs. 53*).—A general discussion of Mendelian cotton breeding is followed by an extended statement of the experimental results from a single cross of Afifi and Truitt. Extended studies of unit characters include the observations made on red spot, hairiness, and shape of the leaf; height and branching of the stem; color, form, and formation of the flower; surface glandulation, shape, and number of divisions of the boll; weight, fuzz distribution, and fuzz color of the seed; and length, color, regularity, weight, and quality of the lint. Other chapters discuss the natural crossing of cotton, the output in ginning, and the history, present status, and future of the cotton crop in Egypt.

Report on the manurial trials on cotton carried out during the season 1908, F. Hughes (*Yearbook Khediv. Agr. Soc. Cairo, 1909, pp. 159–194*).—These pages report the results of tests of superphosphate, sulphate of ammonia, and nitrate of soda as fertilizers for cotton in Egypt. Numerous tables state the physical and chemical analyses of the soils upon which the tests were conducted, the yield at the various pickings, and the ginning output obtained in the work at the various localities.

The work was conducted in both Upper and Lower Egypt, but as the trials in Upper Egypt were all considered more or less unsatisfactory the general conclusions drawn refer only to trials in the Delta. But little difference was observed among the yields obtained after the use of various amounts and mixtures of fertilizers. No relation was shown between the nitrogen in the soil and the effect of the application of nitrogenous fertilizers. Other topics of which the author gives a general discussion in view of the results of these experiments are the relation of the average yield to the chemical composition and physical properties of the soil, the effect of fertilizers on ginning output and weight of seed, and the effect of early sowing on the time required for maturity.

Agricultural varieties of the cowpea and immediately related species, C. V. Piper (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 229, pp. 160, pls. 12*).—The larger portion of this bulletin is devoted to a catalogue of the names and descriptions of the agricultural varieties of the cowpea and some related species, and to a consideration of the names that have been applied to the varieties, in the literature of the subject, especially in experiment station bulletins. It also presents the results of extended studies along botanical and other lines of the cowpea *Vigna sinensis*, the catjang *V. catjang*, and the asparagus bean *V. sesquipedalis*. They are treated as 3 separate species, although the author states that they intergrade fully and all of them hybridize.

In 8 years' work involving 370 lots of foreign seed, and about 630 lots from the United States, 220 varieties of cowpeas, 50 of the catjang, and 35 of the asparagus bean were found to be agronomically distinct. As all of them hybridize "practically every combination of seed, color and shape, with habit and life period can be obtained," i. e. a practically unlimited number of varieties may be obtained. Among the types recognized viz, prostrate, procumbent, low half bushy, tall half bushy, and treelike or erect, the author considers the tall half bushy type to be the most valuable agriculturally.

Color and other seed characters are discussed with special reference to their importance in the identification of species and varieties.

At Madison, Ind. and at the Michigan Agricultural College, natural hybridization has occurred freely, but it is rare in the field in most localities. From 30 to 100 varieties have been grown side by side at the Arlington (Virginia) Farm of this Department during the last 5 years without noticeable contamination.

Heterozygote seeds are not infrequent in foreign lots, but are rare in American varieties. Natural crossing is probably the work of large bumblebees.

The author believes the breeder of cowpeas purely for forage purposes should emphasize particularly size and vigor, habit, with especial reference to erectness and height, prolificacy, disease resistance, weevil resistance of seeds, retention of leaves late in the season, time of maturity or life period, and evenness of maturity. The ideal forage variety is described in detail, and the Whippoorwill, New Era, and Iron are cited as existing varieties approaching this ideal.

The author finds that it is impossible to identify many of the varieties that have been used in experimental work. "In the main the names have been preserved only in a traditional way by seedsmen. This method of identification is often unreliable, as different varieties in many cases have very similar seeds." Some varieties such as Whippoorwill, New Era, Iron, Taylor, and Blackeyed Lady can be satisfactorily identified because no other common varieties have similar seeds. Many names, however, as Black, Clay, Unknown, Red Ripper, Blackeye, Browneye, and Crowder apply to groups instead of varieties, as they indicate primarily a color or shape of seed.

In these studies foreign varieties of cowpeas were found inferior as a rule. "Everything considered, the best varieties of cowpeas tested are Whippoorwill, New Era, and Iron, and recent hybrids of these, including Brabham and Groit."

Report of experiment (1909) on the best seed of Potato oats, A. N. M'ALPINE (*West of Scot. Agr. Col. Ann. Rpt. 10 (1911), pp. 225–229, figs. 4*).—The author divides oat seed samples into large seeds and small seeds. The large seeds include (1) singles, or kernels that bear rudiments that might have developed into bosom oats but did not, and (2) firsts, or oats in which the rudiments did so develop. The small seeds are made up of seconds, or bosom oats broken from the firsts.

This experiment was conducted to determine the relative producing power of singles, firsts, and seconds. Firsts produced heavier yields of straw and grain than either the seconds or the singles. The seconds produced more straw and less grain per acre than the singles. The differences reported range from 23 to 36 per cent in terms of the weight yielded by the singles.

Potato experimental fields, 1910–11, G. SEYMOUR (*Jour. Dept. Agr. Victoria, 9 (1911), No. 9, pp. 630–639*).—These pages state the results of variety and fertilizer tests with potatoes in a number of different localities as well as tests of susceptibility to Irish blight and the possibility of improving the crop by planting full-crowned tubers.

Potato experiments in Southern District, H. Ross (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 885, 886*).—Eight potato varieties were tested at each of 4 farms.

Potato experiments on the South Coast, R. N. MAKIN (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, p. 887*).—The results of fertilizer and variety tests of potatoes conducted at 3 farms are stated.

Suggestions to potato growers on irrigated lands, L. C. CORBETT (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 90, pp. 6*).—In view of the difficulties which have confronted potato growers on the irrigated lands of western Nebraska, and northeastern Colorado during the past year, the author gives directions for potato production on irrigated lands.

Report on sugar beet experiments, 1911, D. TURNER (*Agr. Students' Gaz., n. ser., 15 (1911), No. 5, pp. 133–139*).—Notes on fertilizer tests with sugar beets, and on level plantings in rows ranging from 16 to 21 in. apart and on

ridges, accompany detailed statements of the cost of growing sugar beets and mangels on a Cotswold soil.

Sugar-cane experiments in Antigua, H. A. TEMPANY (*Agr. News [Barbados], 10 (1911), No. 252, p. 403*).—Among 41 varieties of plant canes tested during 1910–11, 16 excelled in yield the standard variety White Transparent with which they were compared. B 4596, the Sealy seedling, and D 1111 produced the highest yields, each exceeding 5,000 lbs. of sucrose per acre. During the past 4 years B 4596 and the Sealy seedling have each averaged more than 6,000 lbs. of sucrose per acre. Among the rattoon canes B 4596 and B 208 produced the highest yields of sucrose in 1910–11, but during the past 3 years B 4596 and B 1528 have led, B 208 standing twelfth in rank.

Sugar-cane experiments in St. Kitts, H. A. TEMPANY (*Agr. News [Barbados], 10 (1911), No. 251, p. 387*).—In variety tests of plant canes B 208 was among the first 5 varieties at 6 experiment stations and B 4596 and D 625 at 4 stations each. Among the rattoon canes B 1753 was among the first 5 varieties at 5 stations but B 208 at only 2 stations.

Sweet potato rots, H. W. BARRE (*South Carolina Sta. Rpt. 1911, pp. 49–51*).—This is a report of tests of methods of storing sweet potatoes.

Sweet potatoes slightly injured by a freeze on October 30 were harvested November 7 and stored in 3 bins holding about 25 bu. each. For 2 weeks an oil stove was kept constantly burning in the storage house, and the 2 windows were kept open except during cold nights. This ventilation and the temperature, which was maintained at between 65 and 80°, drove the excess moisture out of the potatoes. The temperature was then allowed to fall to between 50 and 60°, but several times during January it fell to 45°.

One bin of the potatoes was grown from slips drawn from potatoes affected with black rot, and the remainder from cuttings made from these vines. When harvested the potatoes grown from the slips were found to be badly affected with black rot, while those grown from the vines were free from disease. During January and February the black rot and the nectria rot were found to be making considerable headway on the bin filled with the diseased potatoes, but to only a slight extent in remaining bins.

Some or all of the frosted potatoes in all 3 bins were found to be affected with soft rot after about a month of storage. Rhizopus was easily isolated from them. On March 14, the bin which had been filled with diseased potatoes contained 12 bu. of sound potatoes and 8 bu. of rotten potatoes, and the remaining bins contained respectively 18 bu. of sound and 2 bu. of rotten potatoes and 20 bu. of sound and 2½ bu. of rotten potatoes. The majority of the decayed potatoes in these last 2 bins were completely destroyed, apparently by soft rot.

The author regards the facts that soft rot seemed unable to attack any save the injured potatoes and that the surrounding healthy ones were entirely uninjured as "very much to the credit of this method of storing."

Three similar lots of potatoes were banked on ground which had been leveled off and covered with about 6 in. of pine straw. The potatoes were piled around a box of 6 in. boards, in which numerous 2 in. holes had been bored, and placed in a perpendicular position in the center of each bank. Cornstalks were placed next the potatoes and covered with straw over which was placed a 2 in. layer of soil. On the approach of colder weather 16 days later the banks were covered with about 5 in. of soil. The boxes were kept open during warm days, but closed at night and during cold days. The temperature in the banks varied from 48 to 66° F. during the winter, but never varied more than 5° per day. On March 26 the bank of potatoes grown from slips contained 9 bu. of sound potatoes and 6 bu. of potatoes which showed some rot, while one of the banks of potatoes grown from vines contained 12 bu. of sound potatoes and 1¼ bu. of rotten

potatoes and the other contained 10 bu. of sound and 1 bu. of rotten potatoes. From these results the author concludes "that it is safe to store potatoes in banks in this climate provided they are free from disease when put up and the banks are properly made."

Report for the year 1910 (*Canada Dept. Agr., Tobacco Div. Bul. A12, pp. 45, pls. 2*).—This bulletin consists of 4 papers and an appendix. Earlier work at these stations has already been noted (E. S. R., 24, p. 636).

I. *Ottawa Experimental Farm*, F. Charlan.—This is a brief account of work done at the Central Farm at Ottawa with the Comstock, Spanish, Canelle, Vérel, and Montmélian tobacco varieties. Brief notes are given on the varieties tested and on an attack by the tarnished plant bug.

II. *The Quebec tobacco experimental stations*, O. Chevalier.—This is an account of work done during 1910 at St. Jacques l'Achigan and St. Césaire. At the latter station the crop was practically destroyed by a hail storm. At the former work was done with the varieties Comstock-Spanish Cuban, Big Ohio, hybrid Comstock×Sumatra, hybrid Big Ohio×Sumatra, and Comstock×Sumatra×Sumatra, to determine the effect of nitrate of soda and a proprietary fertilizer. Only a progress report of this work is given. Directions for making beds and for avoiding injury by insects and mushrooms are followed by an account of tests of insecticides. In a preliminary test it was observed that Paris green practically did not interfere with the growth of the plants. Nicotin oxalate interfered only when used in a solution of 1 part to 50 parts of water or stronger. When used in the proportions of 1:25 and 1:10 all the plants were destroyed. Especially marked insecticidal effects followed its use in the proportion of 1:125, at which strength 4 per cent of the plants had to be reset as compared with 6.25 per cent when the strength was 1:250.

The highest yields were produced by Big Ohio×Sumatra, Big Ohio, and Comstock×Sumatra. In a test of 5 fertilizer applications much the latest crop followed the use of a heavy application of manure, while the earliest crop was obtained after an application of the same amount of manure with sulphate of ammonia, sulphate of potash, and superphosphate. Notes are given on the varieties tested.

III. *The Harrow Tobacco Experimental Station*, W. A. Barnet.—Six acres of Leaming corn yielded 100 measured bushels of ears per acre of well-matured hard corn. Six acres of Dawson Golden Chaff wheat winterkilled badly.

Tobacco plants grown under glass were from 10 days to 2 weeks earlier than those grown under cotton, and a hotbed under glass gave plants a week earlier than a coldbed under glass. A solution of nitrate of soda gave excellent results. An application of from ½ to ⅛ lb. of fertilizer per square foot was followed by the best results. Swollen seeds gave as good results as dry seeds and did not allow the weeds to get such a start. The plants under glass and under cotton appeared to be about equally thrifty and strong. The use of 20 ducks as insect destroyers in a 12-acre tobacco patch proved successful. In a test of 4 different fertilizer applications the highest net returns followed the application of 400 lbs. nitrate of soda, 300 lbs. sulphate of potash, 200 lbs. superphosphate, and 10 tons of manure per acre. In another fertilizer experiment an application of sulphate of potash and nitrate of soda gave the best results, phosphoric acid apparently being least required for the Burley tobacco which was used in this experiment. Notes are given on harvesting and curing the crop. The author concludes that a moderate application of commercial fertilizer should supplement barnyard manure if the largest yield of Burley tobacco is to be secured.

IV. *Cleaning and grading tobacco seed*, F. Charlan.—The author describes an apparatus for the mechanical separation of seeds in which the seeds pass down

through a glass tube against an air current and are collected at the bottom of the tube in a cup, the larger and heavier seeds thus appearing at the bottom of the collecting vessel.

Appendix.—A brief history of the tobacco division and its principal experimental and breeding work accompanies a discussion of the principal Canadian tobacco growing centers.

Tobacco crop, 1911, by types and districts, J. P. KILLEBREW (*U. S. Dept. Agr., Bur. Statis. Circ. 27, pp. 8*).—A table states the acreage, yield per acre, and total production in 1909, 1910, and 1911 of (1) cigar, and (2) chewing, smoking, snuff and export types of tobacco, the data being given for each of the principal tobacco-growing States and districts. Another table presents by States and geographical groups of States the acreage, production, and value of tobacco as reported by the Census for 1909 and 1899. The crop conditions of 1911 and the quality of that year's crop in each of the principal tobacco States and districts are briefly outlined.

Notes on some wheat-breeding experiments at the botanical experiment station, Pretoria, J. A. T. WALTERS (*Agr. Jour. Union So. Africa, 2 (1911), No. 6, pp. 765–777, figs. 10*).—The author gives brief notes on 6 years' work conducted for the purpose of (1) securing pure strains of local wheats, and (2) improving the existing breeds by the selection of the best strains.

Wheat manuring experiments, 1911 (*Queensland Agr. Jour., 27 (1911), No. 6, pp. 289–291*).—These pages state the results of tests of nitrolime, superphosphate, sulphate of potash, stable manure, and a proprietary fertilizer, singly and in various combinations, in growing wheat on sandy soils.

HORTICULTURE.

Thirteenth report of the Woburn Experimental Fruit Farm, DUKE OF BEDFORD and S. U. PICKERING (*Woburn Expt. Fruit Farm Rpt., 13 (1911), pp. 151+VII+258–284+11, pls. 10, figs. 9*).—In continuation of previous investigations additional studies relative to the effect of growing fruit trees in grass land are reported and the results secured from the work as a whole are reviewed. The previous experiments dealt with dwarf and standard apples. (E. S. R., 15, p. 474). In the recent work, the experiments have also included pears, plums, cherries, and forest trees. Various pot experiments with trees were likewise conducted to test out numerous suggestions relative to the cause of the stunting effect of grass on trees.

Summing up their work for the past 16 years, the authors find that the action of grass on fruit trees is often so deleterious that it arrests all growth and often causes the death of the tree. None of the trees thus stunted have recovered from the effect, except in cases where the roots began to extend beyond the grassed area. The stunting effect is greatest where the ground around young trees is grassed over immediately after planting. Trees where the ground becomes grassed over gradually during the course of several years apparently accommodate themselves to the altering conditions and suffer much less than when the grass is actually sown over their roots. Nevertheless, the grassing over of the ground around well-established trees has sometimes proved very detrimental to the growth of the tree.

Some varieties of apples were found to be more susceptible to injury than others, but no difference was found between the standards on the free stock and dwarfs on Paradise. Pears, plums, and cherries were likewise affected, though with these trees the standards suffered less than the dwarfs.

The conditions of these experiments have been such as to emphasize the injurious effect of grass. The authors are of the opinion that in some soils,

where the effect produced is not great, grass may be beneficial from a commercial point of view in promoting fruitfulness and by increasing the color of the fruit. The proportion of roots extending into the grassed ground, although sufficient to make the grass effect apparent, was remarkably small, in some cases amounting to only 1/2000 of the weight of the whole tree.

A test of 6 different kinds of forest trees indicates that they are affected by grass in the same way as fruit trees, when the grass is sown immediately after planting. Conifers planted in light soil suffered less than other trees and some recovery occurred with them as time went on. Of 18 different grasses grown under apple trees the deleterious action was greater with the strong-growing grasses than with the weaker ones. Clovers had a similar stunting effect but the color of the leaves was not impaired as with trees growing in grass.

In their search in various directions for the cause of the grass effect the authors have been unable to trace the injurious effect of the grass to the variation in depth of good soil available for root development; to interference with soil aeration, soil temperature, and soil moisture; to its influence on food supply; or to a physical alteration in the soil. Experiments in which the soil was made alkaline indicated that the grass effect could not be attributed to alkalinity produced by the grass in its growth. The bacterial condition of grassed and tilled soils was also partially investigated without revealing any positive relation between the grass effect and either beneficial or harmful soil bacteria. See also a previous note (E. S. R., 20, p. 737). Likewise the general behavior of grassed and tilled soils toward germinating seeds of various kinds gave no direct evidence in favor of a toxic substance in grassed soils.

Finally, in some pot experiments with trees, the authors found that when trays containing grass growing in sand were placed on the surface of the soil or sand in which the trees were growing so that the leachings from the grass reached the tree roots with practically no exposure to the air, the leachings had a very deleterious effect. When the grass leachings were exposed to the air, however, they had a beneficial effect on tree growth. From this evidence the authors conclude that a toxic substance is formed by growing grass, which substance is readily oxidized into some substance which favors plant growth. This explanation, it is pointed out, is in full accordance with what has been established as to the behavior of heated soils toward plants (E. S. R., 24, p. 421).

The appendix of this report contains reprints of papers by S. U. Pickering on Studies of the Changes Occurring in Heated Soils (E. S. R., 24, pp. 301, 420) and Plant-Growth in Heated Soils (E. S. R., 24, p. 421). Some additional work on the germination of seeds in heated soils, here reported, confirms the previous conclusion that there is a continuous increase in the toxic effect from the lowest temperatures of heating upwards. The appendix concludes with a discussion of Experimental Error in Horticultural Work, by the above author.[a]

Agrologic conditions in relation to asparagus culture (*Sta. Agron. Aisne Bul., 1911, pp. 79–85*).—This comprises a brief survey of soil conditions, including analyses of soils from the asparagus region in the vicinity of Laon, France.

Tomatoes.—I, Varieties, culture, and canning, H. P. STUCKEY and J. C. TEMPLE (*Georgia Sta. Bul. 96, pp. 37–68, figs. 7*).—This consists of a collection of notes on varietal, cultural, and canning experiments with tomatoes, conducted at the Georgia Station principally during the past 3 seasons. Introductory considerations deal with the classification and history of the tomato, construc-

[a] Jour. Bd. Agr. [London], 1911, Nov., Sup. 7, pp. 38–47.

tion of hotbeds, management of young plants, and transplanting the plants to the field. Data are given on variety tests conducted in 1901 and from 1909 to 1911, together with descriptive notes on varieties tested in 1911. A study of blossom-end rot is elsewhere noted (p. 648).

Summarizing the data on varieties, the authors find that no one variety maintains its position at the head of the list from one season to another. The terms "early" and "extra early" often bear little relation to the period of ripening of the fruit.

In 1911 vines which were pruned to 1, 2, and 3 stems, respectively, and staked were compared with vines receiving no pruning and staking. All the pruned and staked plats gave a much higher yield than the unpruned and unstaked plat. Vines pruned to 3 stems gave the highest yield and vines pruned to 1 stem gave the least yield. The bearing season of the pruned and staked plats was twice as long as that of the unpruned and unstaked plat, and the fruit was larger and freer from defects, except blossom-end rot. Pruning and staking is not recommended unreservedly, however, since in experiments previously reported (E. S. R., 20, p. 1036) the poorest yields were secured from the staked plat, which likewise showed a greater percentage of disease. In 1911 also a staked and an unstaked plat in an area for the control of blossom-end rot gave results in favor of the unstaked plat.

Data are given showing the percentage of loss from different varieties in the process of canning. Notes are also given on the use of a home canning outfit. The varieties found to be particularly adapted for canning were Paragon, Chalk Early Jewel, Maryland, Beauty, and Acme.

A preliminary study of the forced curing of lemons as practiced in California, A. F. Sievers and R. H. True (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 232, pp. 38, figs. 4*).—This comprises a progress report on a study conducted cooperatively by the Bureau of Plant Industry and various lemon organizations in California to determine the effective factors involved in the process of hastening the coloring of lemons known as forced curing or sweating. The methods used in both curing and the forced-curing processes are described and the experiments thus far conducted are reported in detail.

Experiments have shown that heat and humidity are, contrary to common opinion, of minor importance in coloring lemons and that the pungent, gaseous combustion products given off by the oil stoves used produce the desired effects. The effectiveness of these gaseous products was unimpaired even when conducted to distant rooms by means of pipes, which fact suggests the possibility of using a central generating plant and thereby reducing the risk of fire in the curing rooms. The coloring of lemons was noticeably hastened when confined in spaces constructed of materials of a porous nature, such as earth, brick, or concrete.

A common result of the sweating process is the loss of stems from the fruit. The available evidence, however, does not indicate that the loss of stems increases the amount of decayed fruit, although it may mar the appearance of the fruit. The experiments indicate that the gaseous products applied alone will cause the stems to drop and that humidity and heat are less important factors.

The investigation is to be continued.

The cultivation and manufacture of tea in the United States, G. F. Mitchell (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 234, pp. 40, pls. 2, figs. 11*).—This bulletin brings together the most important results of experiments in commercial tea culture begun a number of years ago by C. U. Shepard and later continued by him cooperatively with the Bureau of Plant Industry at Summerville, S. C. The various phases discussed include history of tea growing in America; description, commerce, and statistics of the tea plant; the details of establishing and maintaining a tea plantation; curing or manufacture; finishing

processes; storage; cost and profit of tea production; and conditions in the experimental tea gardens at Summerville.

The experience with tea culture at Summerville indicates that the quantity of tea produced varies and is influenced by the seed, soil, climate, cultivation, pruning, plucking, and many other causes. A large production seems to be made always at the expense of the quality of the product. It is believed that this experiment "has gone far to demonstrate the practicability of growing tea commercially in suitable parts of this country."

Coconut cultivation in the West Indies (*Imp. Dept. Agr. West Indies Pamphlet 70, 1911, pp. IV+46, figs. 19*).—This pamphlet, which was prepared by F. W. South and H. A. Ballou, discusses the establishment and maintenance of a plantation, and gives an account of the pests and diseases of the coconut palm as at present known in the West Indies, together with a short outline of the preparation and use of various commercial products obtained from this palm.

Cocoa production and trade (*Spec. Cons. Rpts [U. S.] 1912, No. 50, pp. 51*).—This comprises a statistical review of cocoa production and trade in the various producing and consuming countries. A project for the valorization of cocoa is also outlined.

FORESTRY.

Tolerance of eucalyptus for alkali, R. H. Loughridge (*California Sta. Bul. 225, pp. 247–317, figs. 17*).—The first part of this bulletin comprises the results of experiments conducted to ascertain as near as possible the alkali tolerance of the principal eucalypts. The results are based chiefly on a study of seedlings planted at the Tulare Substation. The conditions under which the experiments were conducted are described and the behavior of the different species under alkali conditions, both at the substation and on other plantations, is reported in tabular form and discussed. The remainder of the bulletin, which deals with cultural methods as well as descriptions and uses of various eucalypts, is largely reprinted from a previous bulletin (E. S. R., 20, p. 542).

A general review of the work thus far done shows that the limit of tolerance of alkali salts by eucalypts, as well as in other cultures, increases with care in cultivation and irrigation of the young trees. Alkali tolerance, especially of carbonate of soda, may be increased if the alkali be kept below the roots or at a depth of several feet until the roots have passed beyond the alkali bed, both downward and laterally and the bark of the roots has become sufficiently thick to resist corrosion. Carbonate of soda proved to be the chief hurtful ingredient. The sulphates and chlorids even in large amounts did little injury, except when a thick crust was formed on the surface of the ground. A percentage of carbonate of soda of over 0.07 for many of the species and 0.09 for *E. rudis* and *rostrata* seems to have a retarding effect on the growth. In general a percentage of 0.04 of carbonate of soda in 3 ft. of depth (or about 5,000 lbs. per acre) was usually tolerated without injury by each of the species tested.

British trees, including the finer shrubs for garden and woodland, C. A. Johns, edited by E. T. Cook (*London and New York, [1911], rev. ed., pp. XVI+285, pls. 56, figs. 41*).—This is a revised edition of the late author's Forest Trees of Britain. It is essentially a handbook of popular information relative to the distinguishing characteristics, adaptation, and planting value of the principal trees and shrubs grown in England.

Seeds and seedlings of native and commonly cultivated trees and shrubs in France.—I, Conifers, R. Hickel (*Graines et Plantules des Arbres et Arbustes Indigènes et Communément Cultivés en France. Versailles, 1911, pp. 179, figs. 93*).—In this work the author aims to present sketches and detailed descriptions of seeds and seedlings of French trees and shrubs, based upon personally

selected and studied material. The present part, which deals with conifers, is divided into 2 general chapters, chapter 1 containing keys and descriptions based upon a study of the seeds, and chapter 2 dealing in a similar manner with coniferous seedlings.

Forest species of western Morocco, A. BRIVES (*Bul. Soc. Hist. Nat. Afrique Nord, 1910, No. 6, pp. 97–99*).—Brief notes on the occurrence and distribution of forest species in western Morocco are presented.

An isolated prairie grove and its phytogeographical significance, H. A. GLEASON (*Bot. Gaz., 53 (1912), No. 1, pp. 38–49, figs. 2*).—In this paper the author attempts to explain by the existing distribution certain historical features of the relation of the forest and prairie in central Illinois.

Sketch map showing timber conditions along part of the proposed route of the Hudson Bay Railway, J. R. DICKSON and G. S. PROCTOR (*Dept. Int. Canada, Forestry Branch Map, 1910*).—This map was prepared to accompany Bulletin 17, previously noted (E. S. R., 25, p. 450).

The forests and ligneous plants of Eritrea, A. FIORI (*Agr. Colon. [Italy], 3 (1909), No. 6, pp. 369–391; 4 (1910), Nos. 1, pp. 2–23; 2, pp. 73–88; 3, pp. 171–186; 6, pp. 285–302; 8, pp. 365–386; 5 (1911), Nos. 2, pp. 41–61; 3, pp. 81–100; 4–5, pp. 182–206; 6, pp. 266–296; 5 (1911), No. 12, Sup., pp. 173, pls. 5, figs. 177*).—Part 1 of this contribution comprises a report to the Eritrea Minister of Agriculture, Industry, and Commerce, relative to forest conditions in that colony, including suggestions on reforestation and forest protection. In part 2 the various vegetative zones of Eritrea are described, and part 3 consists of botanical descriptions of the ligneous plants in Eritrea including notes on their economic importance.

Timely forest topics with special reference to forestry in Baden, K. PHILIPP (*Forstliche Tagesfragen mit besonderer Berücksichtigung der Badischen Waldwirtschaft. Frieburg-im-Breisgau, London, and St. Louis, 1912, pp. VI+171*).—This comprises an economic discussion of forest conditions in Baden, in which consideration is given to the various factors influencing the working capital, receipts, and expenditures.

The most suitable size for forest ranges in Wurttemberg, P. WÖRNLE (*Die Zweckmässige Grösse der Forstbezirke in Württemburg. Tübingen, 1911, pp. IV+54*).—This embodies the result of an inquiry among Wurttemberg foresters relative to the size for forest ranges most commensurate with the best development and returns.

[Report on forestry] (*Colon. Rpts., Ann. [Gt. Brit.], 1910, No. 694, pp. 20–24*).—This comprises a brief report on forest conditions, timber species, and trees of economic value in Sierra Leone.

Annual progress report upon state forest administration in South Australia for the year 1910–11, W. GILL (*Ann. Rpt. State Forest Admin. So. Aust., 1910–11, pp. 12, pls. 7*).—Summarized data are given showing alterations in forest areas, and planting and other forest operations, together with a statement of revenues and expenditures.

Forest conservancy, T. J. CAMPBELL (*Admin. Rpts. Forest Conserv. Ceylon, 1910–11, pp. D 10*).—This is the customary annual report of the conservator of forests in Ceylon for the year 1910–11. Summarized data dealing with the constitution, management, exploitation, and administration of the forests are given and discussed, including also a summary of revenues and expenditures for the year.

Facings, CHAMPSAUR (*Rev. Eaux et Forêts, 51 (1912), No. 4, pp. 97–101, pl. 1, fig. 1*).—The methods employed in the Lower Alps in facing or building up ravines to promote the establishment of vegetation and also to prevent further loss from soil erosion are described.

Forest surveying: A text-book and manual, P. SCHILL (*Forstvermessung. Ein Lehr- und Handbuch. Eisenach, 1911, pp. 8+246, tables 3, figs. 216*).—The present work has been designed to meet the needs of forestry students and practitioners in surveying and platting forest areas. Introductory remarks deal with the general principles of surveying. Part 1 treats of the various aids and necessary instruments for forest surveying; part 2 discusses the methods and operations involved in making measurements; part 3 treats of map making; and part 4 deals with the computing and division of areas.

Wood used by the manufacturers of furniture and cars, agricultural implements and vehicles, and veneer in Canada, 1910, H. R. MACMILLAN, B. ROBERTSON, and W. G. H BOYCE (*Dept. Int. Canada, Forestry Branch Bul. 24, 1912, pp. 42*).—In the present report an attempt is made to trace the further manufacture of lumber after it leaves the sawmill by the above classes of manufactures in Canada. The data show the amounts of wood used both by species and by Provinces, together with prices paid for different species. The amount of timber and veneer wood imported is also considered.

The preservation of power transmission poles, W. R. WHEATON (*Engin. Rec., 65 (1912), No. 3, pp. 78–79*).—An account is given of an experimental line of treated western yellow pine poles set by the San Joaquin Light and Power Corporation in 1908.

At the end of 27 months 27 per cent of the poles given a brush treatment with creosote, 29 per cent of the poles painted with carbolineum, 45 per cent of those treated with crude oil, and 28 per cent of those treated with zinc chlorid showed signs of decay, whereas the poles treated with creosote in the open tank (over 50 per cent of the entire line of 600 poles) were all perfectly sound and showed no signs of decay. Similar results are being obtained with western red cedar. Creosote is preferred to zinc chlorid because when the poles are in the middle of irrigated fields the zinc is washed out and they have to be replaced after a brief service.

Treating seasoned v. unseasoned ties, F. J. ANGIER (*Engin. News, 67 (1912), No. 6, p. 241*).—This is an abstract of a paper presented at the annual meeting of the Wood Preservers' Association, at Chicago, January, 1912, and containing data showing the comparative costs and values of seasoned and unseasoned ties as treated by the Baltimore and Ohio Railroad.

In addition to the better penetration of preservatives in the seasoned ties, there appears to be a difference of 1.33 cts. per tie in favor of treating seasoned ties.

The evaporation of creosote and crude oils, P. E. FREDENDOLL (*Engin. Rec., 65 (1912), No. 3, pp. 79, 80*).—Data are given on evaporation studies of railroad ties treated with creosote at different times by the Atchison, Topeka and Santa Fe Railroad. Laboratory tests of different mixtures were also conducted.

Comparing the analyses of the creosotes before and after evaporation, those showing the largest loss were the ones originally having the largest percentages of the low-boiling oils. The author concludes that there is need of more work toward finding some oil or tar that mixed with creosote will lessen the rate of evaporation of the creosote from the mixture. The exact effect of the addition of a high-boiling crude oil has not been determined as yet in these tests.

Scientific management of timber treating plants, D. BURKHALTER (*Engin. Rec., 65 (1912), No. 3, p. 78*).—This paper briefly discusses the general principles of scientific management of industrial plants, and points out the application of certain of these principles to specific problems of timber treating.

DISEASES OF PLANTS.

A plant disease survey in the vicinity of San Antonio, Tex., F. D. HEALD and F. A. WOLF (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 226, pp. 129, pls. 19, figs. 2*).—During 1909 and 1910 the authors made a plant disease survey of a portion of Texas included within a radius of 100 miles from San Antonio. The object of the work was to determine the diseases which were prevalent with a view to more detailed investigation of those which are either new or imperfectly known. Especial attention has been paid to the diseases due to bacteria, fungi, and other parasites, but those induced by environmental factors have also been considered to some extent. After discussing the physiography, soils, and climatology of the region, the different diseases are briefly described under the headings of diseases of fruits, truck crops, field crops, forage plants, trees and shrubs, ornamentals, and native plants.

The smut fungi of Switzerland, H. C. SCHELLENBERG (*Beitr. Kryptogamenflora Schweiz, 3 (1911), No. 2, pp. XLV+180, figs. 79*).—This is a work intended to have direct bearing upon the practical protection of plants, and gives (1) a condensed account of the author's investigations on the smut fungi of this region and their spread, relations, and control; (2) a list of the local plants subject to diseases in connection with their infecting fungi; (3) an alphabetical index of hosts and one of fungi; and (4) an alphabetical list of authors, with their writings in this connection.

Cultures of Uredineæ in 1911, J. C. ARTHUR (*Mycologia, 4 (1912), No. 2, pp. 49–65; abs. in Science, n. ser., 35 (1912), No. 891, pp. 150, 151*).—This is an account of the thirteenth year of culture work with rusts. Due to the unseasonable hot weather many failures in inoculation were reported.

Among the more important results during the year was the discovery of an æcidial host for *Gymnosporangium speciosum* on Philadelphus, belonging to the family Hydrangiaceæ, the previous host plants belonging to the family Rosaceæ. It was also found that both the Uromyces and Puccinia on *Distichlis spicata* produce indistinguishable æcidiospores on the same hosts. This together with culture work has led to the conclusion that in some cases forms are placed in the 2 genera which are not worthy of generic differences and scarcely entitled to specific differences. They are held to represent races, or possibly varieties, of 1 species rather than 2 species belonging to 2 genera.

Variations in Glomerella, C. L. SHEAR (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 152*).—The results are given of studies of various races, strains, varieties, and species of Glomerella from 46 different host plants.

Variations in morphological characters were observed and great variation in physiological character was also found to occur. Most of the variations showed no direct relation to the culture medium or other conditions of environment, and more or less distinct races or strains were found to occur on the same host. These strains maintained their principal characteristics in cultures as long as they were grown.

Plus and minus strains in an ascomycete, C. W. EDGERTON (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 151*).—In cultures of Glomerella cultivated from the petiole of a cottonwood leaf in Louisiana the author has found that the original culture has separated into 2 distinct strains, which he calls plus and minus. The plus strain develops mature perithecia in masses occasionally, these being identical with other species of Glomerella. The minus strain develops the perithecia singly or in two's or three's, scattered over the medium. When the 2 strains are grown on the same plate there is a well marked boundary line where they come in contact. The author believes there is a

cross-fertilization between the 2 strains, as is shown by the fact that ascospores in the same perithecium develop both strains on culturing.

On some resemblances of crown gall to human cancer, E. F. SMITH (*Science, n. ser., 35 (1912), No. 892, pp. 161–172*).—This is the address of the retiring president of the Botanical Society of America, delivered December 28, 1911, a preliminary account of the investigations having been given elsewhere (E. S. R., 25, p. 650).

The relation of stem diseases to soils, K. EWERT (*Deut. Obstbau Ztg., 1912, No. 2, pp. 29–31, fig. 1*).—The author calls attention to the necessity of a closer study of the underground life of plants and of the relations of pomology to geology.

Report of the bacteriologist, W. G. SACKETT (*Colorado Sta. Rpt. 1910, pp. 91–93*).—This contains a summary report of investigations on the bacterial disease of alfalfa (E. S. R., 23, p. 546), bacteriological studies of alkali soils (E. S. R., 25, p. 815), and studies of the hold-over blight in the pear and apple (E. S. R., 25, p. 848) and of raspberry yellows.

The raspberry disease mentioned is said to have been quite troublesome in the vicinity of Loveland, the accompanying canes being small, brittle, discolored, and the young shoots in the spring showing a decided tendency to turn yellow and shrivel. A number of factors seem to be responsible for this condition, among them winter injury, spring freezing, and the presence of the fungus *Sphærella rubina*. Spraying with Bordeaux mixture for the control of the fungus has been carried on with success.

A revision of the North American species of Puccinia on Carex, F. D. KERN and MARY A. FITCH (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 150*).—Notes are given on about 25 species of Puccinia which can be recognized on Carex in North America, the majority of them being endemic. About three-fifths of the species have had their life histories worked out.

Sclerotium rhizodes on Calamagrostis canadensis, A. B. STOUT (*Abs. in Phytopathology, 1 (1911), No. 2, p. 69; Science, n. ser., 35 (1912), No. 892, p. 200; Torreya, 12 (1912), No. 2, pp. 42, 43*).—A partial account is given of the author's investigations of the fungus *S. rhizodes*, which has for its principal host plant *C. canadensis*.

The fungus is coexistent in the leaves, buds, stems, rhizomes, and roots of the infected plants. Filaments of the fungus were also found to form a thin weft on the exterior of the roots and to extend out into the soil. The fungus is shown to have a varying degree of parasitism in the different parts of the host. On the leaves it is said to be vigorously parasitic. In the culms the filaments are most abundant in the region of the nodes, but there is almost no destruction of tissues. In the underground parts of the culms and in the rhizomes the hyphæ completely digest the cell contents of cortical cells, but appear to have no effect on the cell walls except at the points of actual penetration. In the older portions of the roots the hyphæ are scattered throughout the cortex, where they occupy empty cells. In the younger lateral roots the filaments of the fungus were found penetrating living cells and exhibiting characteristics which have been ascribed to mycorrhizal fungi. Ultimately, however, the cell contents disappeared, while the fungus remained intact.

The fungus is said to be perennial in the soil and in the underground portions of the host. It is present in the buds, but is apparently unable to penetrate into the growing apex.

Infection experiments with powdery mildew of wheat, G. M. REED (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 152*).—The author reports experiments in which 80 different varieties of Triticum, belonging to 9 different species, were inoculated with conidia of *Erysiphe graminis* occurring on wheat.

By far the larger number of these varieties proved entirely susceptible to the fungus. Of the 7 immune varieties found, 5 belonged to *T. dicoccum* and 2 to *T. vulgare*. The emmers as a group proved quite free from infection, although some were quite susceptible. In none of the 9 species of Triticum tested was complete immunity found, as in every case one or more varieties of each species gave infection.

On the rust of wheat (Puccinia glumarum), E. Székács (*Wiener Landw. Ztg., 61 (1911), No. 53, p. 609; abs. in Bot. Centbl., 117 (1911), No. 24, p. 633*).—The author gives the results of his investigations, in brief as follows:

Those wheats which show no resistance to infection were found to be full of rust as early as May 15. Neighboring plants were either only partially rusted or wholly intact. This is held to show that the rust is transmitted not only as primary infection (by æcidiospores), but that it also breaks out as inherited disease with favoring weather. The seed is the carrier of the infection, the author believes. An improved seed stock obtained in 1906 by selection was further sifted, so that from 214 elite stocks only 14 remained for breeding. These stocks show decidedly less rust than those which spring from less pure types. By selective breeding it is evidently possible to control the rust. The author appears to be a warm supporter of Eriksson's mycoplasm theory.

A new root disease of malt, H. Schnegg (*Ztschr. Gesam. Brauw., 35 (1912), Nos. 1, pp. 4–7, fig. 1; 2, pp. 13–15, figs. 3*).—This is a noteworthy case of disease ascribed to parasitism by a fungus said to be *Rhizopus nigricans* (*Mucor stolonifer*). Illustrations and descriptions are given of the way in which this fungus was found occupying the interstices between rootlets and sheaths in the case of sprouts 3 days old, attacking both of these structures. It seems not to enter the cells but to force its way between them, loosening the tissue but not penetrating to the vascular bundles, or at least in most cases, to a greater depth than 3 or 4 cell layers of the cortex. The cells are discolored and distorted by the presence of the fungus.

Investigations on Sclerotinia libertiana, Johanna Westerdijk (*Meded. Phytopath. Lab. Willie Commelin Scholten, 1911, pp. 5–26; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, p. 1153*).—This fungus is said to do considerable damage in Holland to lettuce, beans, carrots, clover, and mustard. It passes readily from one plant to another and does not appear to form biological races. Under favorable conditions of growth the fungus does not seem to lose its properties as a parasite. Infection is favored by ruptures in the cortex of the host and by a considerable amount of atmospheric humidity.

Cotton anthracnose, H. W. Barre (*South Carolina Sta. Rpt. 1911, pp. 23–43*).—In continuation of a previous account (E. S. R., 24, p. 741), the author presents a progress report on his investigations relating to the cotton anthracnose, and the relation the fungus bears to distribution under field conditions. The investigations indicate that the seed are one of the most important factors in the distribution of this disease, and that where clean seed are used one year's rotation will eliminate the disease.

The vitality of the fungus in buried bolls and in the seed, and the vitality of the mycelium and spores on the outside of the seed were investigated, and it was found that buried bolls did not give any viable spores after the middle of March, while bolls that had been allowed to lie on the edge of the field against the fence contained the viable fungus up to September. The indications are that the fungus loses its vitality to some extent in the seed, although not entirely so.

A study was made of the progeny from seed of a number of diseased bolls which contained one or more badly diseased or compact locks. The highest

percentage of disease was found on the stalks grown from the seed from the open locks which were badly diseased.

The work on the elimination of disease by seed selection has been continued and seems to offer a practical method of eradicating this disease.

The detection of anthracnose in cotton seed, H. W. BARRE and W. B. AULL, Jr. (*South Carolina Sta. Rpt. 1911, pp. 43–49*).—A description is given of a method for determining the amount of anthracnose on the outside of seeds by means of a centrifuge, the results being checked by germination tests and a study of the resulting seedlings.

The leaf-roll disease of potatoes in Saxony, 1910, K. STÖRMER and O. MORGENTHALER (*Naturw. Ztschr. Forst. u. Landw., 9 (1911), No. 12, pp. 521–551, figs. 2*).—This is a report on the appearance and progress of this disease and the growth of potatoes in relation to such factors as seed, soil, weather, and cultural methods, the last including fertilization, spacing, seed time, etc. The method is semi-statistical, and the work is based on correspondence and reports from some 25 divisions of Saxony.

On potato rot, H. KÜHL (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 1–4, pp. 106–108*).—The author describes the appearances characteristic of tubers infected by Fusarium and by Phytophthora. He also gives an account of his experiments, during which he found that sound potatoes were infected from diseased ones in a damp receptacle, but not in a dry atmosphere; also, that infected potatoes planted in sterilized soil sprouted while rotting in the way characteristic of the disease. He thinks it probable that the potato rot has reached its present extensive range through insufficient precautions heretofore taken in handling the crop.

Suggestions for the combating of diseases and insect pests affecting the sugar beet (*Ann. Amer. Rpt. Sugar Beet Seed Breeding Sta. Wohanka & Co., 3 (1910), pp. 30–54*).—Information is given concerning the nature, spread, and ravages of several important diseases of the sugar beet, with remedies recommended. These include leaf spot (*Cercospora beticola*), root rot (*Rhizoctonia violacea*), black root rot (*Phoma betæ*), sugar beet webworms (*Loxostege sticticalis*) and worms of similar habits, sugar beet nematode or eelworm (*Heterodera schachtii*), sugar beet root louse (*Pemphigus betæ* and *Tychea brevicornis*), crown gall, etc.

Suggestions are made that sugar factories and seed raisers combine resources and unite on various measures for the prevention, control, or eradication of various pests.

Blossom end rot of tomatoes, H. P. STUCKEY and J. C. TEMPLE (*Georgia Sta. Bul. 96, pp. 69–91, figs. 7*).—The authors present their conclusions relating to the cause and methods of control of the blossom end rot of tomatoes. According to their investigations, this disease is of nonparasitic origin and is not infectious. They claim that the organism found accompanying it can not produce the disease except when the plant is under unfavorable conditions.

Experiments to control the disease were carried on both in the laboratory and in the field, in which spraying, effect of nitrogenous manures, crop rotation, variety resistance, and soil moisture were tested. Rotation of crops and picking and destroying rotten fruit were of no value in the control of the disease. Staking the plants, instead of diminishing the loss, increased it. Spraying had little or no effect. There was nothing observed in the experiments to indicate that the use of nitrate of soda or stable manure increased the tendency to rot. Only the small varieties of tomatoes proved resistant to the disease. The disease, it is concluded, can be controlled, if not entirely prevented, by keeping an abundant supply of water in the soil.

Tomato diseases, G. E. STONE (*Massachusetts Sta. Bul. 138, pp. 32, figs. 9*).—The principal portion of this bulletin is taken up with a discussion of the blossom end rot of tomatoes, and an account given of experiments for its control.

The different theories regarding the cause of this disease are summarized, and the author states that his observations on the particular organism causing the rot confirm those of Miss Smith to the effect that the disease is of bacterial origin, as previously mentioned (E. S. R., 19, p. 49).

Soil moisture was found to be an important factor in the control of the blossom end rot in the greenhouse, but there were many other factors, such as light, transportation, plant food, etc., which played an important rôle in its occurrence. The observations of the author on the use of Bordeaux mixture for the control of this disease have not been encouraging. His experiments indicated that subirrigation greatly reduced the percentage of blossom end rot as compared with top-watered plants and that a greater proportion of tomatoes were affected in bright sunshine than where the plants were shaded.

Notes are given on a number of other diseases of the tomato, among them timber rot (*Sclerotinia libertiana*), tomato scab (*Cladosporium fulvum*), sleeping disease or wilt (*Fusarium lycopersici*), downy mildew (*Phytophthora infestans*), anthracnose (*Colletotrichum* sp.), leaf blight (*Cylindrosporium* sp.), leaf blight (*Septoria* sp.), leaf mold (*Alternaria solani*), blight (*Bacillus solanacearum*), nematodes (*Heterodera radicicola*), and surface molds.

The effect of Gymnosporangium upon the transpiration and photosynthesis of apple leaves, H. S. REED and J. S. COOLEY (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 155*).—In connection with pathological studies, the authors determined the water elimination and carbon dioxid consumption of healthy and rusted apple leaves of the varieties York Imperial and Ben Davis. Transpiration was measured on twigs on the trees and determined in grams per square centimeter per hour.

An average of 5 tests of Ben Davis apple leaves showed that in rusted leaves the water elimination was about 50 per cent of that from healthy leaves on the same trees. For determining the rate of photosynthesis Ganong's photosynthometer was used, and the diseased leaves showed marked diminution in power to consume carbon dioxid.

The history and cause of the coconut bud rot, J. R. JOHNSTON (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 228, pp. 175, pls. 14, figs. 10*).—This bulletin deals with a destructive and widespread disease of coconuts, which is said to have been known in Cuba for more than 30 years and also occurs in Jamaica, British Guiana, Trinidad, British Honduras, and elsewhere.

The author has conducted an investigation covering a period of about 4 years on the nature and cause of this disease, a preliminary account of which has been given elsewhere (E. S. R., 25, p. 552). Repeated inoculation experiments have shown that the disease is of bacterial origin, and the organism seems to be identical with *Bacillus coli*. Inoculations into coconut seedlings with *B. coli* of animal origin have given rise to infections similar to inoculations with the coconut organisms.

A bacterial disease of vanilla, G. L. PAVARINO (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), II, No. 3, pp. 161, 162; abs. in Riv. Patol. Veg., 5 (1911), No. 8, pp. 125, 126*).—A description is given of a bacterial disease of vanilla that appeared in the botanic garden of Pavia. It is characterized by the appearance on the leaves of small, irregular spots of a pitch black color. Later the leaves may become perforated through the disintegration of the diseased tissues. The author repeatedly produced the disease through subepidermal inoculations with the bacteria isolated from diseased

leaves. The organism is considered hitherto undescribed and the name *Bacterium briosianum* n. sp. is given it.

Investigations on hollyhock rust, J. ERIKSSON (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 1–4, pp. 93–95*).—The author's findings on his study of *Puccinia malvacearum* are compactly summarized, and support, he claims, his theory of a plasma stage in which the rust is alleged to pass the winter in symbiotic relations with the protoplasm of its host (E. S. R., 25, p. 850).

The perfect stage of the rose Actinonema, F. A. WOLF (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 152*).—The author describes the fruiting bodies of *A. rosæ*, and includes that the development exhibited is not that of an Asterella, but includes characters that necessitate a new generic grouping. This study connects for the first time the conidial and ascospore stage of the organism causing the black spot of roses, and the name *Diplocarpon rosæ* is given to the fungus.

A bacterial disease of tropical orchids, S. HORI (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 1–4, pp. 85–92, figs. 2*).—The author gives a somewhat detailed discussion of the disease called brown rot observed in greenhouses in Tokyo and also on orchids grown in the open air on the Island of Oki in the Japan Sea.

This disease is declared to be identical with that called brown spot (on plants of tougher texture) and to be due to a bacterium. This organism is described by the author and named *Bacillus cypripedii*, although he states that it may be identical with that described by V. Peglion and by him named *Bacterium oncidii*. The disease seems to prefer the finest orchids, those having thick, fleshy, succulent leaves, several species being attacked. The parasite seems to enter the leaf tissue chiefly through wounds made by careless washing. The chlorophyll of the infected cells collects near the center, while the bacteria swarm in the surrounding cell sap. The infection spreads rapidly, browning, rotting, and ruining the plants.

Preventive measures recommended are the use of a soft sponge for washing soaked in a 0.1 per cent solution of sublimate, and also avoidance of excess in watering, which seems to favor the disease.

The influence of Uromyces pisi upon Euphorbia cyparissias, G. TISCHLER (*Flora, n. ser., 4 (1911), No. 1, pp. 1–64, figs. 26*).—An account is given of the author's studies on the life relations of this fungus to its host, of which a partial summary follows:

Shoots of *E. cyparissias* infected with *U. pisi* may under favorable conditions outgrow and free themselves from the injurious effects of the fungus. Early production of pycnidia and æcidia by the latter favors and hastens this change. Ordinarily the fungus remains in the growing point of the shoot as strictly intercellular mycelium, but upon the formation of vacuoles in these cells haustoria strike in at once and range freely, apparently influenced by something in the cell sap. Conditions favoring rapid growth may retard or prevent such invasion of the cells. The growing point, once free of mycelium, remains so. The fungus is apparently unable to grow into this region from the rhizome, where it winters.

The hyphæ (but not the haustoria) grow in the vessels, by preference. Cambium cells are not attacked. Hyphæ are to be found in the pith, and to a small extent, in the bark. The growing mycelium dies off from below upward, and disappears from the vessels, leaving the knotted haustoria in the degenerated cells. Stems are very slightly affected as to form, etc. An extensive dependence seems to exist between the sugar content of the tissue and the localization of the fungus. Infected leaves have high osmotic pressure despite their higher water content. Characteristic alterations in the leaf structure attending infection are (1) changes in cell form, (2) readier cell division, and (3) enlarge-

ment of the intercellular system. The symbiosis of the host cell and the haustoria in a cell goes on peacefully for a time, but finally they become separated by a plasmoderm. It is possible by plasmolyzing the cells to separate them quite distinctly. The leaf cells do not show the characteristic signs of poisoning by the infection until just before their death.

An extensive bibliography is appended.

A leaf disease of Hevea in Surinam, J. KUYPER (*Rec. Trav. Bot. Néerland., 8 (1911), No. 3–4, pp. 371–380, pls. 2*).—A leaf disease of *H. brasiliensis* and *H. guyanensis* due to *Fusicladium macrosporum* n. sp. is described. Three stages of the disease are mentioned. The first is on the young leaves, which show olive or dark green spots on plants in the seed bed. In the second stage black fruiting bodies appear on the older leaves of nursery stock and of larger trees. The third form attacks the petioles and stems of more mature plants. The fungus appears endemic, occurring throughout Surinam in plantations as well as on wild trees.

Spraying with Bordeaux mixture, it is believed, would control the fungus.

The chestnut tree disease, M. MANSON (*Science, n. ser., 35 (1912), No. 894, pp. 269, 270*).—On account of the destruction of the chestnut by the so-called chestnut disease, the author calls attention to the desirability of testing the giant chinquapin (*Castanopsis chrysophilla*) of the Pacific States for planting in the Southern States. This plant is said to occur in 2 forms, one a large tree, the other a shrub, and the author believes that the tree form could be used to reforest the Eastern States devastated by the chestnut tree disease and that it would probably stand the eastern conditions from Maryland south.

Pine leaf cast, HAACK (*Ztschr. Forst u. Jagdw., 43 (1911), Nos. 4, pp. 329–357, pl. 1; 5, pp. 402–423; 6, pp. 481–505, fig. 1; abs. in Hedwigia, 51 (1911), No. 3, Beibl., pp. 202, 203*).—The author gives an extended discussion of this widespread and dangerous disease of pines, ascribed to the fungus *Lophodermium pinastri*.

Pines of all ages show attack in varying degrees. Young pines are usually killed by loss of their leaves, but after attaining an age of 8 or 10 years they usually appear to be able to withstand the injuries. Infection occurs not through conidia but through the spores, which are freed more rapidly in damp weather and are carried by wind and water to considerable distances. The needles which fall in early spring become a new source of infection in summer and autumn. The parasitic mycelium seems preferably to live intercellularly.

Spraying with a weak solution of copper sulphate is recommended, carefully applied, when the apothecia first open in spring and summer. Grass should be kept out of the way of spraying operations, and infected portions of the pine trees should be removed at once.

Leaf cast and nativity of the pine, H. MAYR (*Forstw. Centbl., n. ser., 33 (1911), No. 1, pp. 1–14; abs. in Hedwigia, 51 (1911), No. 3, Beibl., p. 204*).—The author gives his views, as the result of his studies on the pines of Europe, regarding the resistance offered to the fungus (*Lophodermium pinastri*) causing leaf cast. The Norway pine is asserted to suffer least and the southern and southeastern pines most from this disease, while the pines of the Alps and Scotland stand between these in resistance.

Accordingly, the author recommends breeding from the Norway variety as a means of securing a hardy stock for German culture. He mentions the fact that his views are opposed by various other investigators.

Notes on Cronartium ribicola, P. SPAULDING (*Science, n. ser., 35 (1912), No. 891, pp. 146, 147*).—Attention is called to a number of points that have been worked out in connection with the life history of this fungus during the past year. A coarse yellow mottling of pine needles and of the bark on the twigs

has been observed that is said to be very characteristic of the disease when it occurs, but it is usually observed only on trees that have had the disease for more than one year.

In 1910 the author made an attempt to select out the infected trees in a lot of 10,000 3-year-old pine seedlings, and the remainder were planted in the open field in a locality where Ribes was absent for a considerable distance. An examination the next summer showed a considerable number of swellings of the bark, indicating the impossibility of the removal of all infected trees by a single inspection.

The author reports having discovered the disease in 1911 in New Jersey and Virginia. The teleutospore stage of the fungus was found affecting the stipules and bracts of leaves of Ribes sp. in the greenhouse, and it is believed that this explains the anomalous appearance of this fungus on Ribes at Geneva, N. Y. (E. S. R., 18, p. 747).

Experiments in the greenhouse with inoculations on Ribes showed that the teleutospore stage develops only after the cool weather of autumn sets in. Successful inoculations have been made in the greenhouse on young white pine trees with teleutospores secured by inoculation on *R. americanum* of æcidiospores borne upon imported trees of *Pinus strobus*.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Textbook of zoology, J. E. V. Boas (*Lehrbuch der Zoologie. Jena, 1911, 6. rev. and enl. ed., pp. X+690, figs. 618*).—This is the sixth revised and enlarged edition of a work first issued in 1890.

A zoological dictionary, edited by H. E. Ziegler (*Zoologisches Wörterbuch. Jena, 1911, 2. rev. and enl. ed., pt. 1, pp. XXI+208, figs. 188*).—The second revised and enlarged edition of a work first issued in 1907–1910. This first part begins with the word Aal and ends with Elasipoden.

Mammals of the West Indies, G. M. Allen (*Bul. Mus. Compar. Zool., 54 (1911), No. 6, pp. 175–263*).—This is a list of the mammals known to occur in the West Indies with a summary of their recorded distribution and its zoogeographical bearing, based on a study of the collection of the Museum of Comparative Zoology and collections made by the author on the island of Grenada. Three new island races are described.

A bibliography, which includes most of the important papers dealing with mammals of the West Indies, is appended.

Report on condition of elk in Jackson Hole, Wyoming, in 1911, E. A. Preble (*U. S. Dept. Agr., Bur. Biol. Survey Bul. 40, pp. 23, pls. 7*).—Jackson Hole, in the Snake River Valley in northwestern Wyoming, has long been the principal winter home of large numbers of elk, or wapiti (*Cervus canadensis*), but increased settlement has resulted in a shortage of the forage available and large numbers of elk have died from starvation during the past 3 winters. This bulletin reports 3 months' preliminary investigations as to the feasibility of feeding, protecting, and removing the elk in the vicinity, under a special appropriation (E. S. R., 24, p. 405).

The author presents a general description of the region, discusses the value of elk to the community, the feeding of elk in winter, and their life history, enemies, illegal killing, transportation, and winter refuge. The herd is estimated to number about 20,000. It is pointed out that the problem of transportation is a difficult one, because the Teton Range, 2,000 ft. higher than the Snake River Valley, must be crossed on the way to the railroad. A dozen of the more vigorous animals of various ages were, however, successfully trans-

ported to the National Bison Range at Ravalli, Mont., and the Wichita Game Preserve in Oklahoma.

The establishment of a winter refuge, where the feed can be preserved by excluding stock during the summer, is essential for the proper protection of the elk, and is recommended.

The deer of Chantilly forest decimated by helminths, E. BRUMPT (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 13, pp. 906–909; abs. in Jour. Roy. Micros. Soc.* [*London*], *1911, No. 6, p. 760*).—For 4 or 5 years deer living in the forest about Chantilly have suffered from a disease, marked by cachexia, which has resulted fatally to a large number, a score or more of fawns of 10 or 11 months of age dying during the single month of February, 1911. In examinations to determine the infestation of 26 deer, the author found 23 to be infested by *Dictyocaulus nærneri*, 11 by *Œsophagostomum venulosum*, 2 by *D. filaria*, 8 by *Capillaria* n. sp., 4 by *Strongle* sp.?, 8 by *Nematodirus roscidus*, and 3 by *Trichocephalus affinis*. In 3 deer on which post-mortem examinations were made, death was found to have been due to pulmonary strongylosis, complicated in 2 cases by intestinal helminthiasis.

The cultivation of an acid-fast bacillus from a rat suffering with rat leprosy, H. T. HOLLMANN (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 27* (*1912*), *No. 3, pp. 69, 70*).—In this preliminary report the author records having "succeeded in cultivating in pure culture an acid-fast bacillus from a rat suffering with rat leprosy by the method described by Clegg [a] in the cultivation of the human lepra bacillus. Of the 8 rats inoculated with the pure culture subcutaneously acid-fast bacilli were found in all, in the lesion of the skin of 8, in the lungs of 2, and in the nasal discharge of 1. Of the 3 rats inoculated intraperitoneally no lesions of the skin nor of the internal organs were found, but the splenic pulp in 2 of them contained acid-fast bacilli."

A microfilaria (Microfilaria rosenaui n. sp.) from the California ground squirrel (Citellus beecheyi), G. W. MCCOY (*Parasitology, 4* (*1911*), *No. 3, pp. 220, 221, pl. 1*).—The nematode here described as new to science has been found in squirrels coming from all parts of California east of the Sierra Nevada Mountains, and between the Mexican border and the Sacramento River. "Rodents from the southern sections of the State seem to show a higher percentage of infestation than those from farther north. It is probable that at least 5 per cent of the squirrels from the part of the State in which the parasites are found harbor the worm. There is no evidence that the nematode exercises any deleterious influence on the host. The adult forms of the parasite have not been found though careful search for them has been made."

The tarbagan (Arctomys bobac) and plague, P. PREBLE (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 27* (*1912*), *No. 2, pp. 31–39*).—The author summarizes evidence from which he concludes, a priori, that the tarbagan, a marmot common in Siberia and Mongolia, may perform a rôle similar to that of ground squirrels in the transmission of plague. "This has, however, only the value of an hypothesis since bacteriological and pathological proofs are as yet lacking."

A bibliography of 24 titles is appended.

Sixth report on plague investigations in India (*Jour. Hyg.* [*Cambridge*] *Plague Sup. 1, 1912, pp. 206, pls. 14, figs. 15*).—This sixth report includes chapters on Some Recent Observations on Rat Fleas (pp. 7–10); Preliminary Observations on the Protective and Curative Value for Rats of the Serum of a Horse Immunized with a Toxic Nucleo-Protein Extracted from the Plague

[a] Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 2, pp. 77–79.

Bacillus, by S. Rowland (pp. 11–19); and Observations on the Breeding of *Mus rattus* in Captivity (pp. 193–206).

A book on birds, A. W. Bomberger (*Philadelphia, 1912, pp. VII+209, pls. 33*).—This is a popular account.

The birds of Guiana, F. P. and A. P. Penard (*De Vogels van Guyana. The Hague, 1910, vol. 2, pp. 587, figs. 122*).—This second part (E. S. R., 23, p. 555) deals with the orders Picariæ and Passeres.

Studies of bird life in Uganda, R. A. L. and V. G. L. van Someren (*London, 1911, pp. 22, pls. 25*).—Accounts are given, together with plates, of 25 of the land and water fowl of Uganda.

Report of entomological section, C. P. Gillette (*Colorado Sta. Rpt. 1910, pp. 98, 99*).—Observations have been made upon the migratory habits of *Aphis cornifoliæ*, which leaves the dogwood, *Svida* (*Cornus*) *stolonifera riparia*, in the spring and takes up its abode chiefly upon the sunflower (Helianthus) leaves, and then sends return migrants from the sunflowers to dogwood again in the fall. *A. helianthi* and *A. gillettei* are deemed almost certainly synonymous with *A. cornifoliæ*.

A new corn root worm, *Diabrotica virgifera*, and its variety *filicornis*, have done serious injury in limited localities in Colorado for the past 2 years.

Report of entomologist, A. F. Conradi (*South Carolina Sta. Rpt. 1911, pp. 52–60*).—In experimental spraying work carried on in several sections of the State during the year with the cottony maple scale and the gloomy scale, lime-sulphur applied in December satisfactorily controlled the gloomy scale but, like kerosene emulsion, had no appreciable effect on the cottony maple scale. Summer sprays of caustic potash whale-oil soap at the rate of 1:4 were beneficial against the cottony maple scale.

The use of Phinotas oil in springs infested by crawfish resulted in the destruction of the pest.

Life histories of Indian insects.—III, The rhinoceros beetle (Oryctes rhinoceros) and the red or palm weevil (Rhynchophorus ferrugineus), C. C. Ghosh (*Mem. Dept. Agr. India, Ent. Ser., 2 (1911), No. 10, pp. 193–217, pls. 4*).—This paper deals with the rhinoceros beetle (*O. rhinoceros*) and the red or red palm weevil (*R. ferrugineus*), both of which are very destructive to palm trees, especially in southern India, the damage being done by the former as a perfect beetle and by the latter as a larva.

Some important insects of Illinois shade trees and shrubs, S. A. Forbes (*Illinois Sta. Bul. 151, pp. 463–529, figs. 67*).—This is a popular account of some 25 of the more important insect enemies of trees and shrubs in Illinois.

The possible etiological relation of certain biting insects to the spread of infantile paralysis, C. T. Brues and P. A. E. Sheppard (*Mo. Bul. Bd. Health Mass., n. ser., 6 (1911), No. 12, pp. 338–340*).—This is a brief account of investigations conducted from July 30 to September 26, 1911, in which the homes of 88 patients in 17 cities and towns were investigated as to the presence of biting flies and insects in close proximity to affected individuals.

"Nothing absolutely definite has hitherto been ascertained regarding the channels of infection of acute epidemic poliomyelitis. Many facts connected with the distribution of cases and the spread of epidemics of this disease, together with histories of insect bites, suggest at least that the disease may be insect-borne. From our field work during the present summer, together with a consideration of the epidemiology of the disease, it has been suggested that *Stomoxys calcitrans* may be responsible for the spread of acute epidemic poliomyelitis. No facts which disprove such hypothesis have as yet been adduced. Experiments based upon this hypothesis are now in progress."

Notes on the Pediculidæ, II, L. G. NEUMANN (*Arch. Par., 14 (1911), No. 3, pp. 401–414, figs. 8*).—A second article (E. S. R., 24, p. 754), in which the author describes 2 species and 1 variety, *Hæmatopinus suis adventicus* from the hog, as new to science. The genus Pediculus and the camel louse are also briefly considered.

Sheep parasites.—A new species of louse, H. A. REID (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 6, pp. 445–447, figs. 3*).—A brief account of a louse, which infests the legs of sheep in the Banks Peninsula district, and to which has been given the name *Hæmatopinus microcephalus*.

Analysis of grasshopper conditions in Nebraska, M. SWENK (*Nebr. Farmer, 44 (1912), No. 7, pp. 179, 182, 183*).—A discussion of the occurrence of grasshoppers in Nebraska.

The Aphididæ of Nebraska, T. A. WILLIAMS (*Univ. [Nebr.] Studies, 10 (1910), No. 2, pp. 91*).—This, a posthumous publication, is a synopsis of the Aphididæ of Nebraska. Thirty-five species and 2 varieties, previously listed as manuscript names in the author's Host-Plant List of North American Aphididæ,[a] are characterized.

Life history of Schlechtendalia chinensis (a gall producing insect), C. SASAKI (In *Festschrift zum sechzigsten Geburtstag Richard Hertwigs (München). Jena, 1910, vol. 2, pp. 239–252, pls. 2*).—The galls produced on *Rhus semialata* by the aphid, the life history of which is here recorded for the first time, form one of the commercial products of Japan, being largely employed for dyeing, tanning, and other purposes. This insect is distributed in nearly all of the prefectures of Japan and also in the central and southern districts of China.

Coccid enemies of the grapevine, F. PICARD (*Prog. Agr. et Vit. [Ed. l'Est-Centre], 33 (1912), No. 1, pp. 10–18, pl. 1*).—Brief accounts are given of the coccid enemies of the grape, including *Aspidiotus (Targionia) vitis, Aulacaspis (Diaspis) pentagona, Lecanium persicæ* and *L. corni, Pulvinaria vitis, Dactylopius vitis*, and *Rhizœcus falcifer*.

A new enemy of the gooseberry bush, W. J. GOVERTS (*Gartenflora, 61 (1912), No. 2, pp. 40–43, fig. 1*).—This is a brief account of *Pulvinaria vitis*, which the author has found to attack the gooseberry.

Apiosporium oleæ, a parasite of the olive scale, J. RUBY and L. RAYBAUD (*Compt. Rend. Soc. Biol. [Paris], 71 (1911), No. 26, pp. 214–216*).—The authors consider the experiments which they have conducted to demonstrate that there is a specific relation between the yeast forms found in *Lecanium oleæ*, and the sooty mold fungus (*A. oleæ*) which occurs on the leaves of the olive.

Butterflies damaging lucerne, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 22 (1911), No. 12, p. 1022*).—One of the small blue butterflies (*Zizera labradus*) is reported to have been the source of considerable injury to alfalfa.

Longevity in saturniid moths: An experimental study, P. and NELLIE RAU (*Jour. Expt. Zool., 12 (1912), No. 2, pp. 179–204, pl. 1*).—This is a report of experiments undertaken in order to discover the value of some of the theories that have been advanced to account for the duration of life.

On the presence in France and the biology of the potato tuber worm (Phthorimæa operculella), F. PICARD (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 2, pp. 84–86*).—A discussion of the occurrence and biology of this pest.

Concerning the traubenwicklers (Cochylis ambiguella and Polychrosis botrana), and methods of combating them, SCHWANGART (In *Festschrift zum sechzigsten Geburtstag Richard Hertwigs (München). Jena, 1910, vol. 2, pp.*

[a] Univ. Nebr. Spec. Bul. 1, 1891, pp. 28.

463–534, pls. 3).—This account of the grape-berry moths deals with their biology and remedial measures, including insecticides, mechanical and physical means, insect enemies, and fungus diseases. A bibliography of 90 titles is appended.

Revision of Australian Tortricina, E. MEYRICK (*Proc. Linn. Soc. N. S. Wales, 35 (1910), pt. 1, pp. 139–294; 36 (1911), pt. 2, pp. 224–303*).—Seventy genera and 443 species are here described, many of which are new to science. Indexes to the generic and specific names are included.

Experiments on overwintering pupæ of Lepidoptera, W. REIFF (*Ztschr. Wiss. Insektenbiol., 7 (1911), Nos. 5–6, pp. 156–159; 7–8, pp. 235–237; 9, pp. 267–270; 10, pp. 308–312; 11, pp. 343–347*).—The species, studies of which are here reported, include *Papilio glaucus turnus, P. troilus, P. thoas cresphontes, P. polyxenes, Samia cecropia, Telea polyphemus, Basilona imperialis, P. machaon*, and *Hyles* (*Deilephila*) *euphorbiæ*.

Experiments were conducted to determine the effect of (1) exposure to various temperatures and (2) impregnation with a mixture of sugar and gum arabic with and without silver nitrate. Notes by C. T. Brues on the parasites, *Dinotomus excsorius* and *D. cæruleator*, that were reared during the experiments, are appended.

Note on Leishmania and mosquitoes: The Leishmania donovani can live and develop in the intestinal tract of the Anopheles, G. FRANCHINI (*Lancet [London], 1911, II, No. 19, pp. 1268, 1269, figs. 12*).—The author here reports briefly the studies which have led him to conclude that *L. donovani* can develop in the intestinal tract of Anopheles.

The sand-fly and pellagra, S. J. HUNTER (*Jour. Amer. Med. Assoc., 58 (1912), No. 8, pp. 547, 548*).—A paper presented before the American Association of Economic Entomologists, at Washington, D. C., in December, 1911.

On August 1, 1911, the author commenced a survey of the region about Oswego, where in July the first authentic cases of pellagra in Kansas were diagnosed. *Simulium vittatum* is said to be the only species as yet found in the State. Thus far it has been found distributed in Kansas along Turkey Creek, a tributary of the Kaw in Wyandotte County, along the Marais-des-Cygnes in Franklin County, along the Neosho and its tributaries in Labette County, and along the Arkansas in Sedgwick County, the most western point at which it has been found. A careful survey of the southwestern part of the State has thus far revealed no breeding places for adult forms of this insect. It is stated that the survey will be continued until the entire State has been covered.

Experimental attempts were made to transmit the disease from a human case to 10 guinea pigs and 2 monkeys, 499 live flies being exposed to the pellagrin and then to the guinea pigs, and 197 to the pellagrin and then to the monkeys. Of 488 specimens counted, 219 were females, which alone bite. Studies of the brain and spinal cord of a monkey, suspected of having contracted the disease, are now under way.

Phlebotomus papatasii and pappataci fever in South America, C. TIRABOSCHI (*Arch. Par., 14 (1910), No. 2, pp. 330–334*).—In recording the occurrence of *P. papatasii* in the State of Para, Brazil, the author takes the opportunity to review the present status of knowledge as to this fly and the disease which it transmits. The disease, which is known to be due to a filterable virus, is thought to be hereditarily transmitted in the fly. Whether or not the disease occurs in Brazil remains to be determined.

[Transmission of Trypanosoma hippicum by Musca domestica] (*Rpt. Dept. Sanit. Isthmian Canal Com., 1911, Dec., pp. 42, 43*).—Experiments conducted in which the house fly was fed for 3 or 4 minutes on blood from an infected guinea pig and then, after an interval of about 30 seconds, placed over the

scratched skin of mules for about 5 minutes, show that *T. hippicum* may be thus transmitted. It is stated that no new cases of murrina have been detected in the Canal Zone since May, 1910.

The percentage and quality of hides injured by the ox warble in the region of Lyon, N. LEHMANN and C. VANEY (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 20, pp. 1343–1345; abs. in Jour. Roy. Micros. Soc.* [*London*], *1911, No. 5, p. 619*).—In observations made at Lyon extending throughout 1908, 1909, and 1910, warbles were found in hides in every month, but from September to March inclusive they were either retarded larvæ beginning to degenerate or only larval remains. From March to June, when there are no living adults, there is a growing percentage of larvæ in the skin. This fact can only be explained as due to a migration from the viscera. The penetration of the larvæ from the alimentary tract is supported by the following facts: "(1) The winter restriction of the very young larvæ to the submucosa of the anterior portion of the alimentary canal; (2) the growth of the larvæ in the esophageal region; (3) the occurrence in February and March of more developed larvæ in the membrane of the spinal cord and in the subcutaneous tissue of unperforated skin; (4) the increasing abundance of sedentary larvæ in the skin from May to July."

The authors find that while bullocks with thin skins show a greater percentage of warbles present, it is the opposite with cows. This leads them to conclude that there is no relation between the skin thickness and the percentage of infestation.

The relation of weather conditions to the frequency of ox warbles, N. LEHMANN and C. VANEY (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 22, pp. 1508–1510*).—The authors find that in the region of Lyon warm, dry weather during July and August favors oviposition and is followed by a high percentage of warbled hides the following year.

The species of Brachyacantha of North and South America, C. W. LENG (*Bul. Amer. Mus. Nat. Hist., 30* (*1911*), *pp. 279–333, pl. 1, figs. 45*).—Thirty-three species and 11 varieties of coccinellids of this genus are described, of which 6 species and 6 varieties are new to science.

The wild passion-fruit weevil (Œmethylus triangularis), W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 22* (*1911*), *No. 10, pp. 910, 911, pl. 1*).—This weevil has been found infesting the fruits of the wild passion-vine (*Passiflora herbertiana*) over a very large area. Its range is thought to be that of its food plant, which grows in Australia throughout the semitropical scrubs, trailing over low scrub trees.

A comparative study of four digestive ferments in some species of Coleoptera, L. BOUNOURE (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 4, pp. 228–231; abs. in Jour. Roy. Micros. Soc.* [*London*], *1911, No. 5, p. 619*).—A study of the digestive ferments of *Dytiscus marginalis, Hydrophilus piceus, Geotrupes sylvaticus, Melolontha vulgaris,* and *Polyphylla fullo.*

A contribution toward the life history of Emphor bombiformis, J. A. GROSSBECK (*Jour. N. Y. Ent. Soc., 19* (*1911*), *No. 4, pp. 238–244, pl. 1, figs. 2*).—Studies of the biology of one of the larger digger bees are here reported.

A hymenopterous parasite of the bee moth, A. CONTE (*Compt. Rend. Acad. Sci.* [*Paris*], *154* (*1912*), *No. 1, pp. 41, 42*).—Two hymenopterous parasites of the bee moth, *Galleria mellonella* (*cereana*), have been recorded, one the chalcidid *Eupelmus cereanus* by Rondani in Italy, the other *Bracon brevicornis* by Marshall in France. The author here reports having observed a third species, *Apanteles lateralis*, to be very abundant in the vicinity of Lyon and apparently of considerable importance, since it has been reported to attack the larvæ of several moths in England and Germany, including *Eupithecia*

assimilata, Symoothis oxyacanthella, Hyponomeuta padella, and *Elachista tæniatella.* The larvæ of the bee moth are attacked while quite young and do not attain a large size. A single parasite usually develops in each larva. The author has introduced this parasite into hives and finds that the bees pay no attention to its presence.

Descriptions of some new fungus-growing ants from Texas, with Mr. C. G. Hartman's observations on their habits, W. M. WHEELER (*Jour. N. Y. Ent. Soc., 19 (1911), No. 4, pp. 245–255, pl. 1*).—One subspecies and 4 varieties of ants of the genus Atta are described as new to science.

British bee keeper's guide book, T. W. COWAN (*London, 1911, 20. ed., pp. VIII+226, pl. 1, figs. 158*).—A small pocket guide to the management of bees in movable comb hives, and the use of modern bee appliances.

The cecidia of central and northern Europe, H. ROSS (*Die Pflanzengallen (Cecidien) Mittel- und Nordeuropas ihre Erreger und Biologie und Bestimmungstabellen. Jena, 1911, pp. VIII+350, pls. 10, figs. 233*).—The first part of this work (pp. 1–80) is devoted to a general discussion of plant galls, their causal agents, development, etc., and the second part (pp. 81–341) to host tables for the separation of the various forms.

Indexes to the text and to the gall-forming agents, arranged both by genera and by species, are appended.

Slugs injuring field and garden crops in the Government of Moscow, N. VAVILOV (*Abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 5, pp. 745, 746*).—In combating slugs the best results have been obtained by spraying with copper sulphate at the rate of 3 lbs. to a pail of water, or by pulverizing and scattering it over the field.

The parasites that inoculate disease germs, J. GUIART (*Les Parasites Inoculateurs de Maladies. Paris, 1911, pp. VI+362, figs. 107*).—This work consists of 2 parts, the first dealing with insects and the diseases the germs of which they inoculate (pp. 11–184) and the second part with intestinal worms and the disease germs inoculated thereby (pp. 185–358).

Insecticide decisions (*U. S. Dept. Agr., Insecticide Decisions 5, p. 1; 6, pp. 2*).—The first of these decisions relates to the combined arsenious oxid in Paris green and the second to the inert and active ingredients of Bordeaux mixture.

FOODS—HUMAN NUTRITION.

Principles of human nutrition—a study in practical dietetics, W. H. JORDAN (*New York, 1912, pp. XXI+450, pl. 1, figs. 16*).—This handbook, according to the author, is designed for the instruction of students with moderate scientific requirements, whether in colleges, secondary schools, short courses, schools of domestic science, or correspondence schools, rather than students who have specialized in organic and biological chemistry.

Part 1 considers the principles of human nutrition, and part 2 practical dietetics. Some of the subjects discussed are the chemical elements involved in the nutrition of the human body, the compounds of human nutrition, the digestion of food, the distribution and transformations of the digested food, the selection of food or the regulation of diet, food economics, special dietetic methods, the nutrition of the child, the character and food value of certain commercial articles, the preparation of food, and food sanitation.

The physiology and metabolism of growth, W. BIEDERMANN (*Physiologie des Stoffwechsels Physiologie der Zeugung. Jena, 1. half, 1910, Nos. 1–5, pp. VI+980; 1911, Nos. 6–7, pp. 981–1563+X, figs. 475*).—This second volume of the Handbuch der Vergleichenden Physiologie, of which H. Winterstein is the editor, takes up in detail the physiology and metabolism of plants and

animals. The different parts treat of the nutrition of plants and their relation to animals, the nutrition of Protozoa, sponges, Cœlenterata, worms, achene, Crustacea, Arachnids, insects, mollusks, fish, and the higher vertebrates. A bibliography and index are provided. As a whole the volume, which is designed as a reference handbook, presents an exhaustive digest of available information on the subject.

Manual of practical physiology, J. C. HEMMETER (*Philadelphia, 1912, pp. XXII+223, figs. 55*).—This volume is designed as a laboratory handbook for medical students.

Some of the subjects considered are the law of contraction, electromotive phenomena of muscle and nerve, the effect of chemical substances and poisons on the heart, the blood, respiration, nervous system, vision, fermentation, internal secretion, immunity, and vasomotor nerves. An index of authors cited and a general index are provided.

A text-book of physiology for medical students and physicians, W. H. HOWELL (*Philadelphia and London, 1911, 4. ed., rev., pp. 1018+16, pls. 9, figs. 297*).—In preparing the new edition of this work the author has aimed to include the results of recent investigations but at the same time, as in previous editions, to avoid too great detail. As a whole, the volume is a comprehensive handbook.

The chapters of special interest in connection with nutrition are as follows: General methods—history of the protein food; nutritive history of carbohydrates and fats; nutritive value of the inorganic salts and the accessory articles of diet; effect of muscular work and temperature on body metabolism—heat energy of foods—dietetics; and the production of heat in the body—its measurement and regulation, body temperature, calorimetry, physiological oxidations.

In addition, the volume contains in an appendix a section on proteins and their classification and one on diffusion and osmosis.

State and municipal documents as sources of information for institution managers and other students of home economics, C. F. LANGWORTHY (*Jour. Home Econ., 4 (1912), No. 1, pp. 59–73*).—A digest of data on food, nutrition, and other topics related to home economics, designed to show the great value of state and municipal documents as sources of information.

Sixteenth report on food products and fourth report on drug products, 1911, J. P. STREET (*Connecticut State Sta. Rpt. 1911, pt. 2, pp. 101–218*).—A total of 1,406 samples of miscellaneous food products and drugs were examined, including those collected by the station, by the state dairy commissioner, and secured through other sources.

Among the foods examined were a large number of samples of chocolate and cocoa. As shown by average values, the so-called "soluble" cocoas contain about the same amounts of fat and nitrogen as the untreated cocoas, and, as might be expected, show a higher total ash, higher water-soluble ash, and higher alkalinity of ash. "The most striking fact brought out by these averages is that while 1.7 per cent more of the total cocoa is soluble in boiling water, over 3 per cent less of organic matter is soluble in cold water. In other words, the apparent slightly increased solubility is due to the added alkali and not to any change in the cocoa mass itself. On the average, the 'soluble' cocoas show a lower water-solubility of the cocoa mass than those brands making no claim to superior solubility."

A number of gluten preparations are included among the foods examined. One of these was relatively low in starch and high in protein. The others contained from 32.27 to 68.85 per cent starch.

A carbohydrate food recommended as a substitute "for cane sugar, honey, sirup, and all artificially prepared sweets, which produce diabetes," was also

examined, which analysis showed to agree substantially with the composition claimed. "From the label, however, it appears that this preparation is especially recommended as a diabetic food, a recommendation which is not justified by our analysis. That the articles named, sugar, honey, sirup, etc., 'produce diabetes' would be startling if true."

The composition is reported of a cereal coffee and of a prepared coffee which was apparently "a finely ground dried coffee extract."

A sample of alfalfa bread was found to have the following composition: Water, 20.48; protein, 10.62; fat, 1.32; nitrogen-free extract, 63.98; crude fiber, 0.95; and ash, 2.65 per cent.

Among other foods examined may be mentioned soda water and soda water sirups, dried egg, table sauces, grape juice and other fruit juices, condensed soups, and ice cream and ice cream powders.

[Pure food topics], R. E. Rose and A. M. Henry (*Fla. Quart. Bul. Dept. Agr., 22 (1912), No. 1, pp. 100–123*).—Data are reported regarding the examination of a large number of samples of miscellaneous food products.

Report of the state chemist and other information in regard to the pure food and drugs act, R. E. Stallings et al. (*Bul. Ga. Dept. Agr., 1910, No. 51, pp. 178*).—Data regarding the examination of miscellaneous food and drug products are included.

[Pure food work and inspection] (*Ann. Rpt. Dairy and Food Comr. Mich., 17 (1910), pp. 216*).—Data are given regarding the examination of 1,946 samples of miscellaneous food products and waters, of which 1,285 were not found to be adulterated. Details of inspection work and similar matters are included as well as a compilation of state laws regarding the inspection and adulteration of foods and drugs.

Adulteration of food, A. McGill (*Rpts. [etc.] Inland Rev. Canada, 1910–11, pt. 3, pp. 371*).—During the year under consideration 3,746 samples of foods and drugs were examined. Details of this work are reported.

The occurrence of bacteria in the flesh of normal slaughterhouse animals and the technique of the bacteriological examination of meat in cases of forced slaughtering, Zwick and Weichel (*Arb. K. Gsndhtsamt., 38 (1911), No. 3, pp. 327–337*).—The possible occurrence of bacteria in the flesh of slaughtered animals is discussed in relation to the methods of official meat inspection and in the light of tests made by the authors, and the results are reported of examinations by 5 methods of 77 samples from the organs and muscles of slaughtered beef animals and swine.

Of the samples examined, 5 of liver and 1 of neck muscle contained bacteria (*Bacillus coli communis*), but it is not certain that the organisms entered the flesh before slaughtering. In general, the conclusions drawn have to do with experimental methods.

The bacterial content of flesh of normal beeves slaughtered for the trade, Bugge and Kiebig (*Ztschr. Fleisch. u. Milchhyg., 22 (1911), No. 3, pp. 69–80*).—The authors conclude that the flesh of normal animals shows micro-organisms when studied by the Conradi method (E. S. R., 22, p. 183), but they consider it an open question whether the micro-organisms are introduced into the meat from the intestines of the living animals or represent a post-mortem infection. Conradi's method of developing micro-organisms in meat is considered a reliable indication of the presence of small quantities of micro-organisms, but is not regarded as very well adapted to a regular bacteriological inspection of meat.

The poison content of chicken meat after feeding cantharides, Günther (*Tierärztl. Zentbl., 34 (1911), No. 18, pp. 273–276; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 31, pp. 569, 570*).—The author has found that fowls may ingest great numbers of insects containing cantharides (*Meloe* var.) yet

without affecting the meat when fed to man or animals. He now points out that fowls ingesting such insects will yield eggs containing cantharides. The amount found was exceedingly small, and therefore not injurious.

Nitrogen and phosphoric acid in wheat and flour, L. Vuaflart (*Jour. Agr. Prat., n. ser., 22 (1911), No. 39, pp. 395, 396*).—In connection with other work the author has sought to determine the relation between the nitrogen and phosphoric acid present in wheat and flour. He finds that while the nitrogen varies considerably with the season, the amount of phosphoric acid present remains approximately constant under otherwise similar conditions. Experiments are being made to determine whether or not it is possible to increase the phosphoric acid by means of fertilizers rich in phosphates.

Acidity in wheat flour influenced by factors other than unsoundness, C. O. Swanson (*Amer. Miller, 40 (1912), No. 2, pp. 124, 125*).—From the analytical data reported, the author concludes that "in a normal sound flour the greater part of the acidity value is due to phosphates normally present in the flour, and the rest of the acidity is, mostly if not all, due to amino compounds also normally present in the flour. Further, as the phosphates and the amino compounds occur to the smallest extent in the interior of the wheat kernel and to the largest extent in the outer portions and in the bran, the flour streams from which a flour is made up and the method of milling will be the great factor in determining the acidity value. . . .

"A high acidity value does not necessarily mean that the flour is made from unsound wheat. It means that it contains a large proportion of those streams which should go into a lower commercial grade or that the method of milling in regard to cleaning or purification is faulty."

Vegetables as a possible factor in the dissemination of typhoid fever, R. H. Creel (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 27 (1912), No. 6, pp. 187–193*).—The author concludes from experiments reported that "plants cultivated in contaminated soil will take up on the leaves and stems, as they grow through the soils, organisms existing therein. The *Bacillus typhosus* was recovered from the tips of leaves that were, to the naked-eye appearances, free from soil, although it is presumable that microscopic particles of earth were adherent to the leaves. Rainfall will not free vegetables from infected material. . . . Under conditions most unfavorable to the *B. typhosus*, the infection lasted at least 31 days, a period sufficiently long for some varieties of lettuce and radishes to mature."

A study of maple sirup, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 228, pp. 41*).—The author reports the results of the examination of 456 samples of maple sirup, proposes standards for maple sirup, and outlines and discusses methods of examination.

Cheap confectionery, C. H. La Wall (*Penn. Dept. Agr. Bul. 216, pp. 21*).—Data are given regarding the examination of 259 samples.

Sixty-two samples were in a condition described as "dirty," and the wrapping of each piece of candy in waxed paper as a protection from dirt is recommended. Forty of the samples examined were thus protected. The practice of combining toys with candies, or of making articles of candy which are to be played with before they are eaten, the author believes should be discouraged, as it "largely increases the chances of dangerous contamination."

Neither talc, terra alba, nor similar earthy materials were found, nor was saccharin, nor preservatives such as salicylic or benzoic acids. "No instance was found in which any but the authorized colors were used when single colors were present. Where a mixture or a number of colors occurred in the same piece of striped candy no attempt was made to effect a separation. . . .

It is interesting also to note that there is very little evidence of the use of the resinous glazes which were so extensively employed formerly."

So-called "ethereal" flavors were especially noticeable in only 21 of the samples. Sulphur dioxid in detectable amount was found in only 1 sample. The data presented show that there was a wide variation in the amount of candy received for 1 ct. at the prices asked for in the goods sampled, "the variation . . . ranging from 0.21 to 2.11 [oz.] indicating a cost to the consumer of from 76 cts. a pound down to 7½ cts. a pound."

In general, the author concludes that "while marked improvement is observed in the quality of cheap candies as regards freedom from actually harmful ingredients, there is still room for great improvement in the quality of some of the ingredients used, in the form in which candies are made and sold, as well as in the manner of their handling so as to keep them free from dirt."

Cocoa and chocolate—their chemistry and manufacture, R. WHYMPER (*Philadelphia, 1912, pp. XI+327*).—This volume discusses the history, botany, and agriculture of cacao, the manufacture of chocolates and cocoa powders, and the chemistry of cacao with respect to the components of cacao and chocolate and methods of analysis. A bibliography is provided and also an index.

The cost of living, B. SOUCAIL (*Egypte Contemporaine, 1912, No. 9, pp. 1–26*).—Some information regarding food customs and living conditions is included in this discussion of the cost of living.

Experiments on the digestion of vegetables by man, W. PIEPER (*Versuche über Gemüseverdauung beim Menschen. Inaug. Diss., Univ. Halle, 1911, pp. 23*).—The author conducted experiments with normal persons and also with hospital patients suffering from various digestive disorders. Small pieces of carrots preserved in alcohol and then soaked for 2 hours in water were tied in little sacks of silk gauze and given to the patients in capsules. The time of their reappearance in the feces and the condition of the contents of the sacks were carefully noted.

The conclusions reached follow: The presence of hydrochloric acid in the gastric juice is a requisite for the digestion of vegetables, preparing the vegetables for complete digestion, and absorption in the intestines. Its action is somewhat supplemented by long retention of the material in the intestines where bacterial activity takes place. Disturbances of intestinal digestion result in a decreased digestion of cellulose which is believed to be due to a disturbance of the normal alkalinity of the intestines. In the digestion of vegetables both gastric and intestinal digestion are of equal importance; only by the cooperation of the two is a satisfactory assimilation possible.

Digestion of casein, L. GAUCHER (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 19, pp. 891, 892; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 590, II, p. 1109*).—In his study of the digestion of milk, the author made experiments on a boy with a fistula at the opening of the jejunum, from which he deduced that the curdling of milk in the stomach is not necessary for digestion. A large proportion passes into the intestines uncoagulated. The movements of the stomach break up the larger clots under normal conditions, and if the organ is unable to accomplish this, digestion may be hindered by the curdling. No peptonization of the milk takes places until it has passed the duodenum.

Studies in nutrition.—V, The utilization of proteins of cotton seed, L. B. MENDEL and M. S. FINE (*Jour. Biol. Chem., 11 (1912), No. 1, pp. 1–3*).—The experiments here reported were undertaken to learn to what extent cotton seed, which in the form of flour bids fair to become an important article in the human dietary, is utilized by dogs.

The coefficients of digestibility found for cotton seed were from 67 to 75 per cent, as contrasted with from 88 to 93 per cent for meat diets containing comparable or greater amounts of indigestible nonnitrogenous substances. While the authors give no opinion regarding the cause of this manifestly poor utilization of cotton-seed nitrogen, they suggest that the cotton-seed flour may have contained some constituent which inhibited secretion or promoted premature evacuation.

Studies in nutrition.—VI, The utilization of the proteins of extractive-free meat powder; and the origin of the fecal nitrogen, L. B. MENDEL and M. S. FINE (*Jour. Biol. Chem., 11 (1912), No. 1, pp. 5–26*).—The authors call attention to the literature of the subject and describe digestion experiments with dogs in which a powdered meat residue containing 13.2 per cent of nitrogen was fed.

They summarize their results as follows:

"The utilization of the nitrogen of meat powder is distinctly, although slightly, lower than that of fresh meat. The relatively high nitrogen concentration of the meat powder feces is indicative of a loss of this material through the excrement."

In the second part of the paper the nitrogen of the feces under a variety of conditions is discussed briefly from the historical aspect; data purporting to show to what extent indigestible nonnitrogenous substances may influence the amount and character of the feces are presented; and a plan of experimentation is proposed, with which it seems possible to determine approximately to what degree the nitrogen excreted in the feces is derived from undigested or indigestible nitrogenous constituents of the ingesta. This involves (1) the determination of nitrogen of feces resulting from the material under investigation; (2) the determination and subtraction from the above-mentioned quantity of the fecal nitrogen resulting from a nitrogen-free diet to which has been added an amount of indigestible nonnitrogenous matter that will yield approximately the same volume of feces as was obtained from the material specially studied. Any excess of nitrogen is presumably due to undigested or unabsorbed nitrogenous matter of the food material.

"About the thorough utilization of the proteins of wheat there is no question. The probability that those of barley and corn are equally available was pointed out in previous papers of this series. With regard to the legume proteins we must for the present conclude that the presence of indigestible nonnitrogenous materials can not entirely account for their low coefficients of digestibility. These proteins appear to be less readily affected by the digestive processes than those of barley or corn. This resistance is even more pronounced in the case of the cotton-seed protein. Nevertheless, future research with the isolated proteins may modify our opinion with regard to these last 2 classes of materials.

"The lack of animal extractives in vegetable materials has at times been thought to be the cause of the apparently poor utilization of plant foods in comparison with those of animal origin. . . . The fact that the proteins of wheat, and probably those of barley and corn also, are thoroughly utilized lends support to the view that the secretory influences of the extractive materials play a minor rôle in the ultimate utilization. It was pointed out in an earlier paper (E. S. R., 25, p. 864) that certain wheat preparations evoked intense nausea in man, and necessitated forced feeding in the dog experiments, but were, nevertheless, thoroughly digested. This would suggest that psychic secretion does not influence the ultimate utilization to any great extent."

The relation between the protein condition of the body and the amount of protein in the diet, M. RUBNER (*Arch. Anat. u. Physiol., Physiol. Abl., 1911, No. 1–2, pp. 61–66; abs. in Chem. Zentbl., 1911, II, No. 9, p. 626*).—Theoretical

considerations are advanced, which bear particularly upon the relation between protein supply and muscle mass. The protein which is lost from the body immediately after the stored protein, in a case of transition from a protein-rich diet to a nitrogen-minimum is designated "protein of transition" (*Übergangseiweiss*). The loss of such protein is not to be regarded as harmful to the cell condition of the body.

Concerning protein gains, M. RUBNER (*Arch. Anat. u. Physiol., Physiol. Abt., 1911, No. 1–2, pp. 67–84; abs. in Chem. Zentbl., 1911, II, No. 9, p. 626*).—Continuing the above studies, the author considers the physiological function of that part of the nitrogen of the food which remains in the body. The protein which serves for the reconstruction of the cells to their optimum protein condition is designated as "repair protein" or "amelioration protein." It is not possible to continue the storing up of "repair" protein after the maximum nitrogen condition has been reached.

Metabolism in extreme age, R. UHLMANN (*Beitrag zum Stoffwechsel im Greisenhalter. Inaug. Diss., Munich, 1911, p. 13; abs. in Zentbl. Biochem. u. Biophys., 12 (1911), No. 11, p. 416*).—Metabolism is greatly decreased in old age. In many cases an essential factor in this decrease is the poor utilization of the food.

ANIMAL PRODUCTION.

The maintenance rations of farm animals, H. P. ARMSBY (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 143, pp. 110, fig. 1*).—A summary and a critical discussion of investigations on the maintenance requirements of the principal farm animals, which, in its technical sense, means the minimum required simply to sustain life when doing no work and yielding no material product, in distinction from the popular definition which signifies the total amount of feed required for the animal to perform its daily work, or, in the case of young animals, to make normal growth. The fasting katabolism, material katabolized, ratio of protein to total katabolism, influence of body fat, relative constancy of energy katabolism, and the factors affecting the energy requirement for daily maintenance are discussed.

Averaging the results of the main requirements of cattle, which have been studied more extensively than those of other species, it appears that thin cattle require about 10.5 therms, and fat cattle 15.05 therms of metabolizable energy per 1,000 lbs. live weight, or, expressed in terms of available energy, 6.31 and 8.83 therms, respectively. This available energy is not necessarily identical with the energy values in terms of which the values of feeding stuffs and requirements of animals have been expressed by Kellner and others, since Kellner's results were obtained by comparison of productive rations. From the available records, however, the two are probably about the same in the case of concentrated feeds, but the available energy of coarse feeds below maintenance may be greater than their productive values above the point of maintenance. If this should prove to be the case, the estimated requirement of 6 therms of Kellner's production values will give a maintenance ration ample for practical purposes, but which will be a somewhat too large deduction to make in estimating the productive part of the ration.

In discussing the minimum of protein, the author concludes that on a diet containing an abundance of carbohydrates a supply of protein equivalent to the fasting protein katabolism is sufficient to meet the needs of the organism, while it is possible that a less amount will suffice. Fats appeared to be distinctly less efficient than carbohydrates in keeping the protein katabolism at the minimum. From data obtained it is estimated that 0.6 lb. of crude protein,

or 0.5 lb. of true protein per 1,000 lbs. of live weight represents the minimum protein requirement of mature cattle, with a probable range of 0.1 or 0.2 lb. either way under varying conditions. For actual maintenance feeding it is probable that a somewhat more liberal supply of protein would be advisable. For sheep the estimate is 0.55 lb. With 2 swine the nitrogen excretion was equivalent, respectively, to 0.44 and 0.35 lb. of protein per 1,000 lbs. of live weight, or about the same amounts which appeared to be required for cattle and sheep, but no experiments are on record to demonstrate the sufficiency of this amount as a maintenance ration. In the experiments with horses the crude protein digested was equivalent to 0.59 lb. per 1,000 lbs. live weight.

These data indicate a striking uniformity in the minimum requirement of 0.4 to 0.6 lb. per 1,000 lbs. live weight to maintain nitrogen equilibrium under favorable circumstances for the different species. With an excess of protein in the feeds it seems to be a comparatively simple process to transform it into a nonnitrogenous fuel material, with but slight loss, getting rid of the useless nitrogen as urea in the urine. Hence on a high protein ration the protein can serve as a source of energy, but on the whole a considerable surplus of protein over the minimum requirement has not been proved to be of any material advantage.

Investigations thus far have not shown that nonprotein nitrogen has any material value for production purposes, and the conclusion is reached that for the present, pending further investigation, it is desirable to consider ordinarily only the digestible true protein in the computation of rations for productive purposes. The percentage of amino acids in the different proteins which have been studied are presented in tabular form and their significance discussed. In the synthesis of proteins in the animal body it is pointed out that the proportions of the different cleavage products in the protein of the feed is a matter of great importance, although future work may show the possibility that one amino acid may be transformed into another in case of need.

Commercial feeding stuffs, E. H. Jenkins and J. P. Street (*Connecticut State Sta. Rpt. 1911, pt. 3, pp. 219–236, 238–255, 258*).—Analyses are reported of cotton-seed meal, linseed meal, wheat by-products, red dog flour, gluten feed, hominy feed, corn meal, cob meal, rye middlings, buckwheat middlings, oat hulls, ground oats, malt sprouts, dried brewers' grains, dried distillers' grains, dried beet pulp, alfalfa hay, alfalfa meal, beef scrap, bean straw, bean pods, and mixed feeds.

A sample of ears of corn from a crop of 8,435 lbs. of ears to a measured acre yielded 6,690.64 lbs. of shelled corn and 1,744.36 lbs. of cob. The shelled corn contained 27.9 per cent, the cob 43.93 per cent, and the stover 56.87 per cent of water.

Commercial feeding stuffs (*Bul. Ga. Dept. Agr., 1911, No. 53, pp. 95*).—Analyses are reported of rice bran, rice polish, dried beet pulp, beef scrap, wheat products, dried brewers' grains, pea meal, alfalfa meal, cotton-seed meal, cracked corn, hominy feed, corn bran, corn chops, poultry feeds, and mixed feeds.

Inspection of commercial feed stuffs, P. H. Smith, C. L. Perkins and J. C. Reed (*Massachusetts Sta. Bul. 139, pp. 3–32*).—This reports analyses of 322 samples of commercial feeding stuffs, and includes cotton-seed meal, linseed meal, gluten feed, distillers' dried grains, malt sprouts, brewers' dried grains, rye feed, corn meal, ground oats, rye meal, hominy meal, provender, fortified starchy feeds, dried beet pulp, meat scraps, bone meal, alfalfa meal, cut clover, and mixed feeds. The results of inspection are discussed. A tabular list of wholesale cost of feeding stuffs from January, 1911, to August, 1911, is given.

On the composition of barley meal, maize meal, pea meal, bean meal, and sharps (*Agr. Students' Gaz., n. ser., 15 (1911), No. 5, pp. 145–149*).—Analyses are reported of barley, bean, pea, and maize meals, and of sharps.

[Ensilage methods in Bavaria], G. N. IFFT (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 14, pp. 282, 283*).—In Bavaria alfalfa and maize are sometimes grown for ensilage, but the favorite seeding for this purpose is a mixture of forage plants in the following proportions per acre: Giant spurry 19 lbs., mustard 19 lbs., buckwheat 16 lbs., Victoria pea 5.4 lbs., and vetch 2.6 lbs.

The silage is generally preserved in water-tight vats sunk in the ground about 15 ft. deep, with cemented sides and bottoms. The fodder is packed into these vats and covered with boards, to which pressure is applied.

[Stock raising] (*Jahresber. Landw., 25 (1910), pp. 260–331; 354–441*).—This contains abstracts of literature published on investigations and important popular articles on the breeding, feeding, and management of live stock.

Breeders' associations for the year 1911 (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 50, pp. 673–677*).—Statistical and other data on breeders' associations in Germany are presented.

[Live stock feeding in South Africa], E. R. SAWER (In *Cedara Memoirs on South African Agriculture. Pietermaritzburg: Govt., 1911, vol. 2, pp. 1–73, 353–364*).—This discusses the general principles of live-stock feeding and the method of cultivating and feeding crops which are grown in South Africa for feeding live stock. Tables are given summarizing data as to the average composition and digestibility of feeding stuffs.

Animal industry in the Philippines (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 9, pp. 467–528, pls. 6, fig. 1*).—An account of the types of live stock in the Philippines and the general condition of the industry.

All classes of live stock have steadily increased in numbers since the American occupation, but there is a shortage due to the increased demand. There are many natural advantages for keeping stock in the Philippines, and less danger from epizootic diseases than is commonly supposed. The Philippine stock is thought to be better adapted to the conditions than imported stock, though the native stock would be vastly improved by selection, with possibly a few outcrosses. More animals die of neglect than from contagious diseases. What is needed above all other things is an increase of hardy and energetic settlers to develop the industry.

The Philippine horse apparently is largely a result of the blending of the Sulu horse with the Spanish and Chinese horses, the Sulu horse being a descendant of *Equus sivalensis*. Cattle are traced back to the advent of the Chinese and Spaniards, and are therefore of 2 types. The European breeds and zebus which have been imported are proving valuable for crossing with the natives. Swine outnumber other kinds of stock, though the carabao is the most important domestic animal. Good results have been obtained by crossing Berkshire with native swine. Many types of goats are raised, though but little attention has been given to sheep. Chickens are largely distributed throughout the islands, and there are many large flocks.

Appendixes contain statistics on the live stock industry, an official report on beef, and an article by D. J. Fairchild on the breeds of milch cattle and carabao for the Philippine Islands.

Some phases of the problem of importation of cattle into the Philippines, A. R. WARD (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 12, pp. 643–646, pls. 2*).—Indo-China has been the main source of carabaos and draft and beef cattle for the Philippines, but because of the prevalence of contagious diseases it has been arranged to have the export animals gathered upon several islands

for a considerable time previous to shipment. Hongkong has been the chief port on the China coast for shipment of cattle to the Philippines, but can not be relied upon as a source of healthy cattle. Therefore, importation of cattle and carabaos has recently begun from Timor. There was no evidence of contagious animal diseases on the island among the immense herds of carabaos, and it is estimated that it can furnish about 2,000 carabaos for exportation each year, costing in Timor from $20 to $40. The original stock of this cattle is said to have been imported from Java many years ago and of a variety of *Bos banteng*.

Studies on the red cattle of Denmark, with special reference to the so-called "dollar" spots, F. Balzer (*Studien über das dänische Rotvieh, sowie das Rotvieh überhaupt, mit besonderer Berücksichtigung der bei diesen Tieren auftretenden sogenannten Talerflecke und deren Benutzung zur Diagnostik des Schlachtwertes. Inaug. Diss., Univ. Bern, 1911, pp. 45, pls. 3*).—The author's studies lead him to conclude that Danish red cattle originated from a cross between breeds of Mecklenburg and North Schleswig, they being an entirely different type from the other red breeds of Germany. The colored "stars" in the coat are thought to be a good sign of ability to fatten readily.

A bibliography is appended.

Concerning "blue-gray" cattle, E. N. Wentworth (*Amer. Breeder, 5 (1912), No. 2, pp. 9, 10, figs. 3*).—This is an account of the blue-gray cattle in Great Britain, with a report of an experiment at the Iowa Station in which 47 Galloway cows, 24 of which were pure bred, were mated to one white and one roan Shorthorn.

The average birth weight of the first lot of 24 calves was 68.75 lbs.; 20 were blue-gray and 20 were polled; 4 were red-roan, 1 of them by the white bull; and 3 had scurs and 1 had horns. Fifteen sold as a 2-year-old carload, and topped the market on a dull day at $7.25, the average weight being 1,181 lbs. The average gain of steers was 1.69 lbs. per day, and of heifers 1.53 lbs. The heifers dressed 63.79 and the steers 63.87 per cent.

The second lot of calves were all sired by the white Shorthorn. The average birth weight was 76 lbs. All were blue-gray and polled. The third lot, also sired by the white Shorthorn, averaged 82 lbs. at birth; all were polled, and all but 1 blue-gray.

"In conclusion it may be stated that as market animals and as show animals the blue-grays have demonstrated their equality or even superiority, while the opportunity for the use of hardy dams offers hope to countries whose environment has hitherto been considered too rigorous for beef production."

Breeds of Indian cattle, E. W. Oliver and C. W. Wilson (*Allahabad, 1911, pp. 26, pls. 17*).—This contains descriptions and measurements of breeds of cattle in the United Provinces of Agra and Oudh.

Beef production in Pennsylvania, W. A. Cochel (*Pennsylvania Sta. Bul. 112, pp. 3–16, figs. 7*).—The author advocates increased attention in Pennsylvania to beef production. Suggestions are given concerning the type of steer to feed, methods of feeding, and the value of shelter for steers. These are based on data obtained from experiments at the station, which have been previously noted from other sources.

[Feeding tests], N. Hansson (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 43, pp. 52; K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 6, pp. 446–459*).—For fattening swine potato flakes had from 9 to 10 per cent higher feeding value than barley, and from 6 to 7 per cent higher feeding value than maize. Gray starch, a by-product of starch factories, had about the same feeding value as barley. Soaking maize in warm water did not increase its feeding value. Four kg. of cooked potatoes, containing 2.5 per cent of dry matter, had a higher feeding value than 1 kg. of barley, and about equal to

1 kg. of dried potato, while 1.2 kg. of oats was not quite equal to 1 kg. of maize or of dried potatoes. Potato flakes made a satisfactory feed for work horses.

Dried yeast compared with meat meal for fattening swine, RICHARDSEN (*Deut. Landw. Presse, 39 (1912), Nos. 5, pp. 42, 43; 6, pp. 49, 50*).—On a ration of potato flakes and meat meal the average gain per head and day for a period of 98 days was 0.633 kg. (1.39 lbs.), at a cost of 76.4 pfennig (19.1 cts.); on a ration of potato flakes, dried yeast, and linseed meal the corresponding gain was 0.587 kg., at a cost of 78.5 pfennig per kilogram.

Pressed potatoes and potato flakes for fattening swine, H. NEUBAUER ET AL. (*Ber. Landw. Reichsamte Innern, 1911, No. 23, pp. 105*).—In a series of cooperative feeding tests at 8 stations a combination of protein feeding stuffs and potato products was fed to 166 pigs. The average gain per head and day with pressed potatoes was 0.63 kg. and with potato flakes 0.59 kg.

The hog book, H. C. DAWSON (*Chicago, 1911, pp. 414, pl. 1, figs. 52*).—A practical treatise on breeding and raising swine, based on 50 years of experience in handling hogs in the corn belt. There are also considerable data on the history of swine breeding in the United States. The concluding chapter consists of letters written by animal husbandmen of the state experiment stations to illustrate the methods of feeding swine in the different sections of the United States.

Classification of the horse, P. HICKS (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 254–259*).—The author thinks that the domesticated horse is descended from one species instead of several, as is commonly supposed. The characters which distinguish the different species such as lumbar vertebræ, callosities, color, and the articulation of the head and vertebra are regarded as so variable that they are of little diagnostic value. Historical evidence is also presented.

The Mongolian and the so-called Assyrian wild horse, H. KRAEMER (*Mitt. Deut. Landw. Gesell., 27 (1912), No. 3, pp. 33–37, figs. 5*).—The author fails to find convincing evidence that the oriental horse is a descendant of *Equus przewalski*, although future osteological study may provide a common ancestor for both.

Scale of points for Philippine pony (*Philippine Agr. and Forester, 1 (1911), No. 7, pp. 138, 139*).—This is a scale of points used in teaching the classes in animal husbandry of the Philippine College of Agriculture.

Modern riding and horse education, N. BIRCH (*New York, 1912, pp. 301, pls. 25, figs. 8*).—A popular work on equitation. Considerable attention is given to the psychology of the horse and the evolution of the saddle.

The psychology and training of the horse, S. VON MÁDAY (*Psychologie des Pferdes und der Dressur. Berlin, 1912, pp. IX+349, figs. 7*).—A treatise on the mental characteristics of horses, based on our knowledge of the physiology of the equine nervous system and sense organs.

Clever Hans: A contribution to experimental animal and human psychology, O. PFUNGST, trans. by C. L. RAHN (*New York, 1911, pp. VI+274, pl. 1, figs. 15*).—An account of experiments in testing the mental capacity of an unusually intelligent horse, with a brief description of the methods by which he had been trained.

[Cost of raising a horse in Denmark] (*Hoard's Dairyman, 43 (1912), No. 4, p. 148*).—The different items given in this estimate of raising a horse in Denmark to the age of 2½ years amount to a total of $121.50.

Domestication and acclimatization of wild mammals, D. E. LANTZ (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 264–269*).—The wapiti, white-tailed deer, and native fur-bearing animals are among those mentioned as perhaps worthy of breeding in captivity on a large scale.

The economic significance of rabbit breeding, ATTINGER (*Landw. Jahrb. Bayern, 1 (1911), No. 15, pp. 901–912*).—An argument in favor of extending the rabbit and Belgian hare industry as a source of cheap meat for urban populations. Comparisons are made with other kinds of live stock to show the relative profits and economy of production.

Principles and practice of poultry culture, J. H. ROBINSON (*Boston, New York, and London, 1912, pp. XVI+611, pl. 1, figs. 570*).—A profusely illustrated work on poultry, written from the practical point of view. Though there are many breeds described, this feature is made subordinate to the broader aspect of the problems of the poultryman. The economic status of the poultry industry is discussed, and the views of practical poultrymen and the results of scientific investigation are presented in popular form.

The numerous illustrations include many poultry houses and appliances now in use at the state experiment stations. The bibliography which is appended contains over 250 references, including many bulletins of the experiment stations and publications of this Department.

Feeding tests with meat meal in rations for poultry, K. GREGGERS (*Fütterungsversuche bei Geflügel mit Fleisch und proteinreichen Futtermitteln tierischer Provenienz. Inaug. Diss., Univ. Bern, 1910, pp. 123*).—In a test with several meals of animal origin the digestion was normal and there was no unfavorable effect on the skeletal system. Egg production ceased earlier than with normal hens. Fish meal was more favorable for egg production than meat meal. The eggs were of poorer flavor than normal eggs, but could be preserved in the usual way. The meat meal increased the intensity of the yellow color of the yolk. The flesh of birds fed meat meal was normal as regards taste and odor, though slightly changed in color, melting point, and fat, which were higher than normal but lower than normal with fish meal. In all cases the iodin number was much below normal. When fed cadaver meal the flesh of the fowl had a rancid taste, and whenever fed should be as free from fat as possible. Tuberculous beef did not cause tuberculosis in the hens.

These results and other data are presented in tabular form. A bibliography is appended.

A new high egg record, W. R. GRAHAM (*Breeder's Gaz., 61 (1912), No. 5, p. 257*).—A note on the record of 6 Barred Rock hens at the Ontario Agricultural College. Between October 1, 1910, and October 1, 1911, the egg records of the 6 hens were 243, 252, 256, 256, 268, and 282 eggs, respectively.

In regard to transporting poultry into Germany (*Min. Bl. K. Preuss. Verwalt. Landw., Domänen u. Forsten, 7 (1911), No. 9, pp. 194–197; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 40, pp. 736, 737*).—This is a statement of the laws in regard to the shipment of poultry into Germany, with particular reference to the prevention of poultry diseases.

The prehistoric origin of the common fowl, F. J. STUBBS and A. J. ROWE (*Zoologist, 4. ser., 16 (1912), No. 181, pp. 1–14, figs. 6*).—Evidence is presented which indicates that the common fowl was present in Babylonia in the fiftieth century B. C.; that it was introduced into Egypt about 4600 B. C.; to the Mediterranean countries from Mesopotamia at some unknown but very early date; and to India by a race from the northwest, known as Dravadians, at an unknown date. It is assumed that the original wild stock is long extinct as in the case of many other domesticated animals. No evidence has been found that the fowl originated in India, but the species is now feral there as in many other parts of the world.

Experiments on xenia and inheritance in fowls, P. HOLDEFLEISS (*Ber. Physiol. Lab. u. Vers. Anst. Landw. Inst. Halle, 1911, No. 20, pp. 93–111, pl. 1*).—

To supplement observations on the phenomena of xenia in maize (E. S. R., 23, p. 38) the author mated an Italian cock, of partridge color, with a Plymouth Rock hen. The shells of some of the eggs subsequently laid by the hen were white, which indicated that the formation of the shell was in part a function of the germ. This is considered to be of the same nature as the xenia in plants.

Observations were also made on the inheritance of the feather color in the hybrids.

The development of certain instincts and habits in chicks, F. S. BREED (*Behavior Monographs, 1 (1911), No. 1, pp. 78, figs. 11*).—A study of the instinctive reactions, such as drinking and pecking, and of acquired reactions to color, form, and size.

The early post-embryonic life of the chicks continued the scope of activities already begun in the egg. The water was usually found by fortuitous pecking, or by performing the drinking movement in imitation of other chicks. The stimulus for the pecking reaction did not have to be some object of the size convenient for eating. The bill of the chick was used as a testing organ. It did not appear that the effect of social influence was such as to increase the rate of improvement in the accuracy of the pecking reaction. The chicks responded selectively to 1 of 2 objects of different size. The results of the form tests reported were purely negative. The color quality, as well as intensity, was assumed to be a determining factor in reactions. For the acquired reactions the "index of modifiability" is considered a more satisfactory name than "trial and error."

Studies on the physiology of reproduction in the domestic fowl.—V, Data regarding the physiology of the oviduct, R. PEARL and MAYNIE R. CURTIS (*Jour. Expt. Zool., 12 (1912), No. 1, pp. 99–132, figs. 4*).—A study of the lower portions of the oviduct led to the following conclusions:

"After entering the infundibulum the yolk remains in the so-called albumin portion of the oviduct about 3 hours, and in this time acquired only about 40 to 50 per cent by weight of its total albumin and not all of it as has hitherto been supposed. During its sojourn in the albumin portion of the duct the egg acquired its chalazæ and chalaziferous layer, the dense albumin layer, and (if such a layer exists as a distinct entity, about which there is some doubt) the inner fluid layer of albumin.

"Upon entering the isthmus, in passing through which portion of the duct something under an hour's time is occupied instead of 3 hours as has been previously maintained, the egg receives its shell membranes by a process of discrete deposition. At the same time, and during the sojourn of the egg in the uterus, it receives its outer layer of fluid or thin albumin which is by weight 50 to 60 per cent of the total albumin. This thin albumin is taken in by osmosis through the shell membranes already formed. When it enters the egg in this way it is much more fluid than the thin albumin of the laid egg. The fluid albumin added in this way dissolves some of the denser albumin already present, and so brings about the dilution of the latter in some degree. At the same time, by this process of diffusion, the fluid layer is rendered more dense, coming finally to the consistency of the thin layer of the laid egg. The thin albumin layer, however, does not owe its existence in any sense to this dilution factor, but to a definite secretion of a thin albumin by the glands of the isthmus and uterus. The addition of albumin to the egg is completed only after it has been in the uterus from 5 to 7 hours. Before the acquisition of albumin by the egg is completed a fairly considerably amount of shell substance has been deposited on the shell membranes. For the completion of the shell and the laying of the egg from 12 to 16, or exceptionally even more, hours are required."

On the ovarian factor concerned in the recurrence of œstrus, F. H. A. MARSHALL (*Jour. Physiol., 43 (1911), No. 5, pp. XXI, XXII*).—The ovaries of dogs were exposed and every follicle showing on the surface was pricked with a knife or needle. The subsequent period of heat was of normal duration and severity. Post-mortem examinations revealed the remains of the artificially ruptured follicles.

It is thought that heat in dogs is not brought about by the ripening follicles, and that the phenomena of proœstrum and œstrus are both results of some further factor which is probably to be sought for in the ovarian interstitial cells. This conclusion, though contrary to the prevalent view, is in conformity with Heape's observations upon monkeys, in which menstruation was found not to be necessarily associated with either mature follicles or corpora lutea.

The permeability of the ovarian egg membranes of the fowl, O. RIDDLE (*Science, n. ser., 34 (1911), No. 886, pp. 887–889*).—Laying hens receiving a normal ration were arranged in 5 lots each. To one lot hexamethylentetramin (urotropin) was fed; to another, sodium benzoate; and to a third, sodium salicylate. The test lasted for a period of 8 or 10 days, and all of the eggs laid during the week preceding the beginning and all laid during the second week after the close of the period were kept as control. The amount of drugs given in each case was 0.4 gm., administered in gelatin capsules twice each day. Two birds were not in good condition on the fifth day of the dosing and were withdrawn from the experiment. All eggs were kept at moderate temperatures (12 to 18° C.) until the last of the control eggs were laid, then all were placed at a temperature which fluctuated from 20 to 32°, in order to compare the keeping qualities. The eggs of the series were laid between June 30 and July 30, and known therefore as summer eggs, which are specially difficult to keep.

Comparisons of the eggs were made August 20, September 17, October 12, and November 10. Those from the lot fed hexamethylentetramin were more palatable and left no doubt whatever as to the preservative effect. On the latter dates eggs from the control lot almost without exception were quite unpalatable, while the dosed eggs could be eaten, although they would never be mistaken for really fresh eggs. The albumin had also been changed somewhat in consistency. When tested for formaldehyde by the Rimini and other tests, abundant quantities were yielded. In fact, such eggs were spontaneously giving off formaldehyde in quantities sufficient to be absorbed by and detected in some control eggs left in the same box.

The eggs from hens dosed with salicylate, and less markedly than from those dosed with benzoate, appeared better preserved than the control eggs, though numerous chemical tests failed to demonstrate the presence of either benzoate or salicylate from birds fed these substances. It is suggested that larger doses of these substances would probably yield more striking results.

From this work it would appear that hexamethylentetramin when fed to hens passes through the follicular and vitellin membranes and is deposited in the egg, where it undergoes decomposition, setting free formalin, which acts as a preservative.

The behavior of fat-soluble dyes in the organism, L. B. MENDEL and AMY L. DANIELS (*Proc. Soc. Expt. Biol. and Med., 8 (1911), No. 5, pp. 126, 127*).—A study was made of the movements of the dye Sudan III in starvation and in phlorhizin and phosphorus poisoning. It was found to migrate readily into the blood with the fat under these conditions, but is rarely found in the liver tissue because it is excreted with the bile into the intestine, from which it may be reabsorbed. It is insoluble in water and is not excreted through the kidneys except where alimentary lipuria is induced. Thus, a path of elimination for fat-soluble substances is provided for through the biliary secretion.

The distribution of fat-soluble dyes within the organism depends upon the presence of fat and its migrations. Thus they may be carried to and from adipose tissues, deposited in the egg yolk, or secreted in the company of fat in the milk of animals, but apparently do not tranverse the placenta. No inability on the part of animals to utilize fats in which Sudan III has been deposited was noted.

Some aspects of cytology in relation to the study of genetics, E. B. WILSON (*Amer. Nat., 46 (1912), No. 542, pp. 57–67*).—The author is not convinced that the heredity of particular traits can be traced to cell elements, though unit characters may be in some way connected with material substances. The "determiners" or chemical substances are thought to be differential factors of ontogenetic reactions that belong to the germ cell as a whole, and though present conceptions of cell organizations are extremely crude, they are deemed of value in suggesting methods for further inquiry.

Heredity one of the large controllable forces, W. M. HAYS (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 276–284*).—An address before the American Breeders' Association, February, 1911, in which is emphasized the importance to the human race of controlling heredity in plants, animals, and man.

Inheritance of nontraumatic eye defects in horses, E. EHRENSBERGER (*Die Vererbung nicht Traumatischer Augendefekte beim Pferde. Inaug. Diss., Univ. Bern, 1910, pp. 55, pls. 4*).—Inheritance charts of a number of strains of horses are presented to show that congenital eye defects are a dominant character in inheritance.

The "chestnuts" in Equidæ, F. HOCK (*Die Kastanie der Equiden. Inaug. Diss., Univ. Bern, 1910, pp. 50, pl. 1*).—A histological study of the "chestnuts" and a review of theories as to their nature. It is suggested that they are of glandular origin and have become abnormal through friction.

A bibliography is appended.

DAIRY FARMING—DAIRYING.

Report on milking machine trials in 1909 and 1911, W. GOODWIN (*Midland Agr. and Dairy Col. Bul. 1, 1911–12, pp. 16*).—As a result of these trials the following conclusions are drawn:

"With a milking machine of the type in question the milk yield appears to decrease more rapidly than is the case where the cows are milked by hand. The fat in machine-drawn milk compares favorably with, and is often higher than, that in hand-drawn milk. When the machine is used the cows must be stripped by hand. The strippings may be as little as 5 per cent, but are often more if the machine is worked with ordinary unskilled labor. The difficulty of preventing the teat cups falling off was not overcome in the trials in question, although great attention was paid to this point in view of the prevention of contamination of the milk. It was difficult to keep various parts of the machine in a suitably clean state, and the milk was in consequence often of a bad flavor. In the second trials a marked improvement was shown in the cleanliness of the machine milk, due to the special care which was taken.

"It would appear that the various parts of the milking machine harbor bacteria, which are often detrimental to the production of a good, clean-flavored product. While such organisms are certainly present in ordinary hand-drawn milk to a slight extent, the contamination is commonly nullified by the natural bacterial flora of the milk. Whilst the number of bacteria in the machine-drawn milk was in excess of that in hand-drawn milk, many of the organisms had no action upon milk. The mere counting of bacteria is, therefore, not an absolute guide in such cases.

"The cheese made from milk which has been drawn by a machine is very unsatisfactory unless great pains are taken to keep the parts of the machine thoroughly clean. The slower development of acidity in the case of the cheese made from machine-drawn milk points to very considerable difference in the variety of organisms present in the two cases. When starter was added, a greater proportion was necessary in the case of the machine-drawn milk than in that drawn by hand, to bring about the production of a marketable cheese, because of the fact that the numbers of deleterious bacteria present in the machine-drawn milk were such that a heavier inoculation of the starter was required to overcome them.

"A point of paramount importance to the dairy farmer, and one which presents considerable difficulites, is, how to obtain a proper disinfection of the milking machine without an expenditure of time and money of which ordinary farm practice and current prices of dairy products will scarcely permit, while the operator must needs have no little mechanical skill."

Milking machines and disease, M. HENRY (*Agr. Gaz. N. S. Wales, 22 (1911), No. 12, pp. 1023, 1024*).—It is maintained that the use of milking machines will not cause disease in the dairy providing they are kept scrupulously clean, are not used on diseased cows, and are of the right type.

Cow-testing associations in New York, A. J. NICOLL and J. DAVIS (*N. Y. Dept. Agr. Bul. 30, 1911, pp. 333–359, pls. 3*).—A record of what has been accomplished by the cow-testing associations of the State, with data on milk production, cost of feed, and returns from milk.

A test in feeding niger cake to milch cows, J. SEISSL and N. WESTERMEIER (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 10, pp. 1211–1223*).—Niger cake was found to be a good feed for dairy cows, although not quite so valuable as soy-bean meal.

Influence of extracts from fodder beets and beet chips on the fat content of milk, A. MORGEN, C. BEGER and F. WESTHAUSSER (*Landw. Vers. Stat., 75 (1911), No. 5–6, pp. 349–356*).—In continuation of work previously noted (E. S. R., 24, p. 369), it was found that amid extract from fodder beets and beet chips when added to a ration low in fat increased the yield of milk, but not the fat content, in the case of 2 out of 3 groups.

The use of saltpeter to remove turnip flavor from milk, F. REISS (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 12, pp. 731, 732*).—On testing a sample of market milk it was apparent that saltpeter had been added to counteract the turnip flavor.

Composition of milk as drawn from the cow by the calf, O. WELLMANN (*Milchw. Zentbl., 7 (1911), No. 7, pp. 304–312, fig. 1*).—The milk was obtained from a calf by inserting a cannula through a fistula in the esophagus. At the beginning of the meal the fat content was less and the saliva content greater than toward the end of the meal. The percentage of solids-not-fat remained fairly constant.

On the change from colostrum to milk, with special reference to the nitrogen content, S. ENGEL and L. DENNEMARK (*Hoppe-Seyler's Ztschr. Physiol. Chem., 76 (1912), No. 2–3, pp. 148–158*).—In cows there is no essential difference between the colostrum of the first and successive lactation periods. Milk fever prolonged the colostrum period. The colostrum of sheep was similar in nature to that of cows, though nearer the condition of normal milk. The colostrum of the mare was much richer in casein than the milk. The acidity of colostrum in all cases was very high.

[Infection of milk in the home], C. C. MORRELL (*Brit. Med. Jour., 1911, No. 2658, pp. 1531, 1532*).—Cockroaches were obtained from a new steamship which had a daily inspection as regards cleanliness. "Each specimen was kept

under aseptic conditions until defecation took place. The freshly deposited feces were emulsified in a drop of sterile water; from this emulsion slides were prepared, and cultures were made on bile-salt neutral red lactose agar and in litmus milk. When colonies of bacilli formed on the bile-salt medium they were picked off and subcultures were made in litmus milk, gelatin, and peptone solution and in fermentation tubes containing 1 per cent solutions of glucose, lactose, and saccharose in peptone water. Incubation was conducted in all cases at 37° C.

"Cultures were made from 17 specimens; of these, 5 produced colonies of bacilli upon the bile-salt medium with subculture results as follows: Four produced acidity and clotting of milk, acid and gas in glucose, lactose, and saccharose, and production of indol; the bacilli were Gram-negative, and did not liquefy gelatin, thus corresponding in their reactions with *Bacillus lactis ærogenes*. One specimen produced gas in glucose and lactose, liquefied gelatin, and coagulated milk with subsequent peptonization, thus corresponding with *B cloacæ*.

"In 5 cases after acidification had been brought about by fecal emulsion inoculated into litmus milk, the development of greenish molds of the Aspergillus variety occurred, and in 1 case the spores of the fungus were present in sufficient numbers to be easily identified by the microscope in the freshly made fecal emulsion.

"In order to prove the transmission of known organisms, I fed several specimens upon the sputum from a tuberculous patient, upon pus containing staphylococci, and upon spores from cultures of an Aspergillus fungus. In the first case the insects were preserved until defecation took place, and after the feces had been examined and proved free from acid-fast bacilli, the cockroaches were fed upon the tuberculous sputum, which they all devoured voraciously.

"The *B. tuberculosis* was present in feces passed within 24 hours of feeding and was readily identified by the Ziehl-Neelsen staining reaction. In 1 case an insect vomited salivary fluid within a few minutes of feeding and died within a few hours, but whether or not death was brought about by indigestion of the morbid material I am quite unable to say.

"Two specimens which fed upon staphylococcic pus showed staphylococci in their feces, and cultures upon agar were obtained from these. Four specimens fed upon morsels of bread dusted with the spores of Aspergillus fungus showed the spores in great numbers in the feces some few hours later, and cultures of the fungus grew luxuriantly upon milk which was inoculated with these feces."

These experiments indicate that cockroaches, and probably other insects, may be active agents in souring milk and in disseminating molds and other pathogenic bacteria in pantries and cellars.

Dairy fundamentals, O. Erf and O. C. Cunningham (*Columbus, Ohio, 1911, pp. 96*).—A quiz compendium, accompanied by laboratory exercises, on milk and milk products, and testing milk, cream, butter, and cheese.

The application of the theory of errors to investigations on milk, S. H. Collins (*Jour. Bd. Agr. [London], 1911, Sup. 7, pp. 48–55, fig. 1*).—A demonstration of the value of the theory of errors in testing milk, and a discussion of the relative accuracy of different methods of determining the specific gravity in estimating the amount of fat and total solids in milk.

Milk and other liquids were first tested with a 20 cc. plummet on a balance turning to a tenth of a milligram, and then tested with the lactometers. The error of the plummet was about ±0.00003, a small amount compared with from ±0.00018 to ±0.002 in the errors of the lactometers.

The total solids were determined "by drying from 1 to 2½ gm. of milk in dishes from 4 to 10 cm. diameter, some platinum, some porcelain, some dried in an air-oven, some in a steam oven, some quickly, some slowly. It was found that the probable variation of a single determination from the mean is ±0.068. This figure represents the probable variation from the mean, not the probable variation from a superior method, as in the case of the lactometers.

"Where the conditions are rigidly uniform, the probable variation from the mean will be less than this figure; but when results from different laboratories are compared, I think that ±0.068 per cent total solids reasonably represents the variation of a single determination in one laboratory from the mean of many results in many laboratories. Where laboratories are not well equipped the error may be greater."

The fat was determined by the use of the Gerber method. Without any attempt at standardization the probable variation of a single determination from the mean of all determinations was ±0.036 per cent. The methods of calculating the probable error in determining solids-not-fat are given and show that these calculations produce the important result that the small lactometers often sold are quite useless for determining the solids-not-fat, but that if a lactometer with a fairly open scale be used quite good results can be obtained.

The results of testing the morning milk of a herd of 5 cows at Offerton Hall for 5 years are given in the form of a frequency curve, showing that the distribution of fat percentages follows quite closely the normal probable curve. The use of the slide rule is recommended in applying the theory of errors.

Other conclusions reached are the following: "The error of sampling small quantities of milk by experienced men is negligible, but the error of sampling large quantities of milk by inexperienced men is so great that the analysis is a mere farce. The error due to the milker is a personal matter, impossible to express in general terms. The error due to the times of milking is a subject on which much work has incidentally been done. By compiling many statistics on the subject, I calculate that if cows are milked 24 minutes later in the morning than they used to be, no other change taking place, the fat will, on the average, be 0.1 per cent lower than it used to be in the morning. Hence, irregularity in times of milking will cause variations.

"At Offerton Hall, with the experimental herds of 5 cows, the average difference between to-day's test and yesterday's test is 0.22 per cent fat. It is quite impossible to say whether this figure is representative of any general state of affairs. It is quite clear that the errors of experiment are greater than the errors of analysis, and it should be obvious that the fluctuations of practical dairying are greater than the errors of experiment.

"The error of the solids-not-fat depends upon the method used, but by the use of the Gerber machine, a good lactometer and a slide rule, the error can be reduced so that 8.45 per cent solids-not-fat can be read as 8.45±0.05; that is, that the truth probably lies between the limits 8.40 and 8.50."

Roumanian sheep cheese, D. Frangopol (*Milchw. Zentbl.*, 7 (*1911*), *No.* 7, *pp. 289–296*).—The methods of making several varieties of cheese are described and analyses are reported.

The cause of the dark coloration on the surface of Harz cheese, A. Wolff (*Milchw. Zentbl.*, 7 (*1911*), *No.* 7, *pp. 296–303*).—The organisms present on the surface of the cheese were isolated, and the cause of the defect was thought to be due to the action of several organisms, the chief one being a species of bacteria to which the name of *Bacterium denigrans* was given. Subsidiary causes were peptonizing bacteria, *Mycoderma casei*, and other organisms.

On the influence of pathological milk in the manufacture of cheese, F. W. J. BOEKHOUT and J. J. OTT DE VRIES (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 23–25, pp. 559–567*).—The acidity, catalase, bacterial, and leucocyte contents of pathological milk are given. When not over 10 per cent of mastitis milk was used for making Edam cheese it interfered but little with the normal process of ripening, though the use of such milk is condemned from a hygienic standpoint.

VETERINARY MEDICINE.

Handbook of the technique and methods for immunity research, edited by R. KRAUS and C. LEVADITI (*Handb. Tech. u. Methodik Immunitätsforsch., 1 (1908), pp. IV+V+1138, pls. 3, figs. 127; 2 (1909) pp. IV+1219, pl. 1, figs. 133; 1 (1911), Sup., pp. 664, pls. 14, figs. 25*).—The first volume of this work is a comparatively complete treatise on methods of immunity research, and embraces both veterinary and human medicine. Its topics include antigens and antibodies; toxins concerned in blackleg; bacterial hematoxins; snake venoms; ricin, abrin, and robin; preparation of antigens by chemical and physical methods; methods of vaccinating against rabies, anthrax, blackleg, hog erysipelas, fowl cholera, tuberculosis, peripneumonia (lung plague) in bovines, rinderpest, and foot-and-mouth disease; immunizing against swine plague bacteria and protozoan diseases; the use of tuberculin for diagnostic purposes; the cutaneous and conjunctival tuberculin reactions; and mallein.

The second volume treats of the following topics: Technique for producing antibodies in large animals; method of immunizing small experimental animals and of obtaining antibacterial and antitoxic immune sera from large animals; production of antibodies by chemical and physical methods; tetanus and blackleg antitoxins; bacterial antihematoxins; phagocytosis; opsonins; bacteriolytic, streptococcic, anthrax, hog erysipelas, fowl cholera, hog cholera, swine plague, rinderpest, sheep pox, and rabies serums; agglutination (technique and methods); technique and methods of protein differentiation (precipitin method) with particular reference to forensic blood and meat examinations; bacterial precipitins; anaphylaxis; and the technique of the Bordet-Gengou complement fixation method with particular reference to diagnosing infectious diseases.

The first supplementary volume of the work treats of the following topics: Avidity and determination of the avidity of antigens and antibodies, tetanus toxin and antitoxin; the intracutaneous valuation of diphtheria antitoxin; dysentery and cholera toxins and antitoxins; meningococcic and anthrax serums; technique and methods for tropin research; phagocytosis and opsonins (Wright's technique of vaccination); the local tuberculin reactions; anaphylaxis and experimental analysis of anaphylactic poisons; serovaccination against hog erysipelas; vaccination against tuberculosis; tuberculin preparations for diagnostic and curative purposes; cutaneous and conjunctival tuberculin reactions in the bovine; diagnosis of glanders with the aid of the new immunity reactions; protective vaccination against rabies and antirabic serum; technique for investigating acute poliomyelitis; vaccines for smallpox; the clinical utilization of the agglutination and complement fixation tests; antibodies and tuberculosis; serum reactions with malignant growths; hemagglutinins of plant origin and their antibodies; and pathogenic micro-organisms against pests (rats, field mice, etc.).

In regard to filterable virus, DOERR (*Centbl. Bakt. [etc.], 1. Abt., Ref., 50 (1911), Beiheft, pp. 12–23*).—A critical discussion in regard to filterable viruses and the factors limiting the passage of micro-organisms, etc., through a bisque filter.

In regard to chemotherapy, EHRLICH (*Centbl. Bakt. [etc.], 1. Abt., Ref., 50 (1911), Beiheft, pp. 94–108*).—A critical discussion of the various factors which influence the results of arseno-therapeutics.

Method for administering Salvarsan, RIPS (*Berlin, Tierärztl. Wchnschr., 27 (1911), No. 44, pp. 798–800, figs. 3*).—A description of the apparatus as employed by the author for giving intravenous infusions of Salvarsan. The advisability of giving diluted solutions of Salvarsan is particularly pointed out.

The technique of Salvarsan injections, MIESSNER (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 45, pp. 817, 818*).—A criticism of Rips' article noted above. It is not deemed necessary to use a diluted solution of alkaline Salvarsan. The chief precaution to be taken is to avoid an excess of alkalinity.

Fixation of the minimum mortal, toxic, and therapeutic doses of barium chlorid, when administered subcutaneously, for the frog, pigeon, and rabbit, E. MAUREL (*Compt. Rend. Soc. Biol. [Paris], 72 (1912), No. 5, pp. 182–184*).—The investigations here reported led to the conclusion that 0.08, 0.05, and 0.04 grains, respectively, are the minimum fatal, toxic, and therapeutic doses for the pigeon, and 0.05, 0.03 or 0.04, and 0.02 grains, respectively, for the rabbit.

Aerial contamination as a fallacy in the study of amebic infections by cultural methods, R. T. WELLS (*Parasitology, 4 (1911), No. 3, pp. 204–219, pl. 1*).—"Amebæ of at least 2 different types are, in this part of India at any rate, commonly present in the air, just as are many molds and bacteria. These amebæ can readily gain access (1) to specimens of feces, however carefully collected, (2) to specimens of pus or other material which has, either before or after removal from the body, been exposed to the air, and (3) to any material after it has been inseminated on Musgrave's medium contained in Petri dishes."

Text-book of clinical diagnosis of the internal diseases of domestic animals, J. MAREK (*Lehrbuch der klinischen Diagnostik der inneren Krankheiten der Haustiere. Jena, 1912, pp. XII+957, pls. 26, figs. 465*).—This work presents the subject under the following headings: General remarks on the investigation of disease (pp. 1–31); anamnesis (pp. 32–34); description of animals (pp. 35, 36); conformation of the body and state of nutrition (pp. 37–40); general behavior of sick animals (pp. 41–48); the skin (pp. 49–122); the lymph glands and lymphatic tissue (pp. 123–137); the visible mucous membrane (pp. 138–140); body temperature (pp. 141–172); respiratory organs (pp. 173–361); circulatory organs (pp. 362–442); digestive organs (pp. 443–632); urinary organs (pp. 633–726); genital organs (pp. 727–760; organs of locomotion (pp. 761–772); nervous system (pp. 773–861); blood (pp. 862–896); clinical microscopy and bacteriology (pp. 897–908); and immunity reactions (pp. 909–932).

Text-book of pathogenic micro-organisms, P. VON BAUMGARTEN (*Lehrbuch der Pathogenen Mikroorganismen. Leipsic, 1911, pp. X+955, pl. 1, figs. 85*).—This book is divided into a general and a special part. The general part deals with the position of the bacteria in the botanical kingdom, general morphology and biology of bacteria, the occurrence of pathogenic bacteria outside of the body, general methods for investigating bacteria, and methods for the detection of pathogenic micro-organisms in the air, water, and soil.

The special part deals with the classification of pathogenic bacteria, bacterial blood parasites and bacterial tissue parasites of various kinds.

Parasitological and pathological investigations of man and the lower animals in Tonkin, C. MATHIS and M. LEGER (*Recherches de Parasitologie et de Pathologie Humaines et Animales au Tonkin. Paris, 1911, pp. VIII+451, pls. 15, figs. 21*).—This collection of papers deals largely with the protozoan diseases of man and the lower animals in Tonkin, French Indo-China. An account of the anopheline mosquitoes of that Province, including 15 species, is included.

Annual report of the veterinary pathologist for the year 1910–11, R. E. MONTGOMERY (*Dept. Agr. Brit. East Africa Ann. Rpt. 1910–11, pp. 64–118*).—This report of work of the year includes appendixes which discuss investigations of East Coast fever, swine fever, variola of sheep and goats, Nairobi sheep disease, and gastro-enteritis (coccidiosis) of cattle.

Report of veterinary bacteriologist, G. GARDEN (*Ann. Rpt. Dept. Agr. Nyasaland, 1911, pp. 24–27*).—A report of the occurrence of and work with diseases of animals in the Nyasaland Protectorate.

On the lesions produced in the appendix by Oxyuris vermicularis and Trichocephalus trichiura, R. L. CECIL and K. BULKLEY (*Jour. Expt. Med., 15 (1912), No. 3, pp. 225–245, pls. 4*).—The authors conclude from the studies here reported that *O. vermicularis* and *T. trichiura* are, when they occur in a diseased appendix, in most cases the existing cause of the pathological changes found.

Restraint of domestic animals, G. R. WHITE (*Nashville, Tenn., 1909, pp. 302, figs. 332*).—This work is divided into 5 parts, dealing respectively with restraint of the horse in a standing posture (pp. 11–70) and recumbent position (pp. 71–216), of the ox (pp. 217–246), of the dog (pp. 247–271), and of the hog (pp. 273–286).

A contribution to the study of the vesicular bile of bovines, A. DANIEL-BRUNET and C. ROLLAND (*Compt. Rend. Soc. Biol. [Paris], 71 (1911), No. 28, pp. 298, 299*).—The authors report analyses made of the contents of the bile bladder of bovines.

Examination of the urine as a diagnostic aid for detecting foreign bodies in bovines, NEIDINGER (*Österr. Wchnschr. Thierheilk., 1910, p. 43; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 34, p. 612*).—Many of the conditions caused by the presence of foreign bodies in the reticulum are accompanied by peritonitis, and the urine from bovines was therefore found to contain albumin which was detected by the nitric acid test. Twenty-nine cases out of 33 gave a positive test. All cases were due to the presence of foreign bodies.

A mild venereal disease of horses and cattle (vesicular exanthema), C. J. REAKES (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 6, pp. 454, 455*).—The author here reports upon 2 cases of vesicular exanthema.

Anthrax and tick fever, W. H. DALRYMPLE (*Amer. Vet. Rev., 40 (1912), No. 5, pp. 601–610*).—The chief deductions made from practical experiments with anthrax are as follows: "(1) In these experiments at least, no anthrax infection was found in the excreta of buzzards fed animals dead of the disease; (2) buzzards, after feeding upon anthrax flesh, have their bills and feet contaminated with anthrax infection, which they may carry considerable distances and create fresh foci of the disease; (3) after feeding upon anthrax flesh, the vomitus from the buzzard, which is frequently emitted after a full meal, may be infected, and may also produce fresh centers of the disease; and (4) the house fly and the ant, and probably other forms of insect life, after feeding upon or otherwise coming in contact with anthrax flesh may become extremely dangerous as carriers of the infection."

In regard to increasing the efficiency of the Strassburger method for detecting anthrax, M. MÜLLER and A. ENGLER (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 4–5, pp. 347–353; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 28, pp. 509*).—The author sought to increase the efficiency of the Strassburger method, which employs gypsum rods for the purpose of obtaining sporulation, in the diagnosis of anthrax. Pasteboard, elder wood, and cedar wood were found to be without value. Lime-gypsum rods and rolled paper were less efficient than gypsum rods, while brick was found to bring about a quick sporulation of the organisms, but presented difficulties when attempts

were made to scrape off the culture on the surface. Moist chalk and moist clay were found to be much better than gypsum rods.

Diagnosis of glanders with the precipitin reaction and the relation of these precipitins to the glanders agglutinins, M. MÜLLER (*Ztschr. Immunitäisf. u. Expt. Ther., I, Orig., 3 (1909), No. 4, pp. 401–421, fig. 1; abs. in Hyg. Rundschau, 21 (1911), No. 8, pp. 440, 441*).—The precipitin method can be used for the diagnosis of glanders provided the various specifications prescribed by the author are observed. In guinea pigs the precipitin content of the blood first increases and then the agglutinin content. The reverse is the case with the rabbit. The layer test is to be given the preference over the mixing test. For the precipitin reaction filtrates from bacterial emulsions which were not previously shaken are advised.

Rapid diagnosis of glanders with the aid of the complement fixation method, MIESSNER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 60 (1911), No. 3–4, pp. 327–329*).—After pointing out that he had already devised a rapid agglutination method, the author states that by the use of a water bath instead of a thermostat regulated to 37° C. for the complement fixation method judgment can be passed within an hour as to whether the horse is glanderous or not.

Rapid diagnosis of glanders, M. MÜLLER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 61 (1912), No. 7, pp. 607, 608*).—A polemic in regard to priority in the use of the agglutination-centrifuging method[a] for diagnosing glanders.

Microscopic diagnosis of rabies, S. B. MOON (*Jour. Amer. Med. Assoc., 57 (1911), No. 9, p. 735*).—A modification of the Van Gieson technique, which is employed at the Pasteur Institute of Virginia, and has furnished good results, is as follows:

"Smears containing pyramidal cells of the hippocampus, or Purkinje cells of the cerebellum, are prepared in the usual manner, allowed to dry, and fixed for 2 minutes in ethyl or methyl alcohol. They are then dried with blotting paper and stained. Two or 3 drops of a saturated solution of rosanilin in acetone (U. S. P.) are added to 10 cc. of water, which is agitated with a pipette, and soon becomes a brilliant rose-red color. Then 2 drops of a half-saturated aqueous solution of methylene blue are added, and the satin is applied to the smears. Staining is completed in 1 or 2 minutes, without heat. The slide is then washed under the tap, dried, and examined. Should a weaker than saturated solution of rosanilin be employed, it is only necessary to add more of it, drop by drop, to the water, till the usual brilliant rose-red tint is obtained, when the result will be found about the same as that obtained with the saturated solution."

The essential features of the lesions caused by Trypanosoma hippicum, S. T. DARLING (*Compt. Rend. Soc. Biol. [Paris], 72 (1912), No. 5, pp. 150–152*).—The author has studied lesions in mules and horses, monkeys (Cebus and Nyctipithecus), coati (*Nasua narica*), raccoon, dog, rabbit, guinea pig, rat, and mouse, and with the exception of Nyctipithecus and the raccoon comparisons have been made with normal tissues. "The lesions, similar in type to those caused by other pathogenic trypanosomes, are due to an intoxication resulting in cellular degenerations, anemia, lymphocytosis, terminal ecchymoses of serous and mucous membranes, edema and extensive hyperplasia of lymphoid and myeloid tissue, with focal, cellular infiltrations which are partly inflammatory and partly hemopoietic in function."

A method for the bacteriological detection of tuberculosis in bovines, E. SCHARR and OPALKA (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 46, pp. 833–840, figs. 5*).—The method consists of swabbing the walls of the trachea of

[a] Berlin. Tierärztl. Wchnschr., 1908, No. 34, pp. 595, 596.

the suspected animal with a small wad of cotton fastened upon a piece of thin flower wire and passed through a special canula which has been previously inserted into the trachea between the intertracheal rings. The material obtained on the swab is used for the bacteriological examination.

The relative importance of the bovine and human types of tubercle bacilli in the different forms of human tuberculosis, W. H. PARK and C. KRUMWIEDE, Jr., ET AL. (*Jour. Med. Research, 25 (1911), No. 2, pp. 313–333*).—Continuing previous work (E. S. R., 25, p. 287) the authors have reviewed some of their later results and the results of other workers.

They now conclude that "bovine tuberculosis is practically a negligible factor in adults. It very rarely causes pulmonary tuberculosis or phthisis, which causes the vast majority of deaths from tuberculosis in man and is the type of disease responsible for the spread of the virus from man to man. In children, however, the bovine type of tubercle bacillus causes a marked percentage of the cases of cervical adenitis leading to operation, temporary disablement, discomfort, and disfigurement. It causes a large percentage of the rarer types of alimentary tuberculosis requiring operative interference or causing the death of the child directly or as a contributing cause in other diseases. In young children it becomes a menace to life and causes from 6⅓ to 10 per cent of the total fatalities from this disease."

The experimental transference of tuberculosis from man to bovine, A. EBER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 59 (1911), No. 3, pp. 193–364*).—The material utilized in this work was obtained from 15 cases of tuberculosis in man, 7 of which were pulmonary cases and 8 surgical cases. For comparison 2 cases of tuberculosis in bovines were employed.

The material from the above cases was injected subcutaneously and intraperitoneally into rabbits and guinea pigs for propagation. Simultaneous subcutaneous and intraperitoneal injections were then made into bovines with the material obtained from the guinea pigs and rabbits.

The results show that the bacilli reisolated from 3 out of 7 of the lesions produced in cattle by the pulmonary tuberculous material had the characteristics of the bovine type of bacillus, although the original material was unquestionably of the human type. From a granulation case of tuberculosis of the knee joint in a 9-year-old child which contained the human type of bacillus and which was injected into bovines, the bovine type was isolated.

The vaccination of cattle against tuberculosis, II, T. SMITH (*Jour. Med. Research, 25 (1911), No. 1, pp. 1–33, figs. 4*).—This article deals with the pathogenic effects of certain cultures of the human type of tubercle bacillus in calves (E. S. R., 20, p. 1187).

The results show that "calves may succumb to a tubercular pneumonia, not seen in the spontaneous bovine disease, after an intravenous injection of certain cultures of the strictly human type. The initial rise of temperature usually appears within 10 to 15 days and death may ensue after 1 or 2 months. Tuberculosis of both eyes associated with complete blindness may be a result. The culture used in the foregoing experiments, which proved fatal to calves, was rather below than above the average virulence of the human type for rabbits. The sensitiveness to tuberculin may persist in calves to from 8 to 12 months after an injection of living bacilli of the human type. A second, and a third, larger dose of the same strain is quickly and easily disposed of by the calves which have survived the first dose."

My method for combating tuberculosis in bovines, W. BUROW (*Berlin. Tierärztl. Wchnschr., 27 (1911), Nos. 36, pp. 637–645; 37, pp. 669–672; Sup. Table, pp. 32*).—A general discussion in regard to 1,200 vaccination tests conducted with Tuberculosan, a preparation made from several kinds of bacteria

of the hemorrhagic septicemia group. The tests were conducted by 62 veterinarians, 58 of whom reported favorable results. The detailed protocols of 206 animals are included.

Vaccinating against tuberculosis in bovines with Tuberculosan (Burow), KIRSTEIN (*Deut. Landw. Presse, 38 (1911), No. 90, p. 1027; abs. in Molk Ztg. [Hildesheim], 25 (1911), No. 98, pp. 1844, 1845*).—Practically the same material as noted in the abstract above.

In regard to therapeutic measures for tuberculosis in bovines, with particular regard to Tuberculosan (Burow), T. FLEISCHHAUER (*Arch. Wiss. u. Prakt. Tierheilk., 37 (1911), No. 3, pp. 243–270; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 45, p. 823*).—Favorable results were obtained with this preparation, and the author recommends a systematic study of its value.

Contagious abortion of cows, W. J. MACNEAL and H. W. MUMFORD (*Illinois Sta. Bul. 152, pp. 530–543*).—The purpose of this bulletin is the brief presentation of a number of facts which concern the cause, preventive measures, and restriction and eradication of this disease, as established by the results of recent researches.

Bacteriological examinations were made of the afterbirths of 18 cows, of which 6 appeared to be clinical cases of contagious abortion, and in 2 cases the authors isolated the organism originally described by Bang and Stribolt. In order to eradicate the disease from the herd the authors recommend that "the affected cows should be isolated, and their genital passages cleansed once or twice daily with an antiseptic solution until all discharge has ceased, when they may be returned to the herd; all infectious material (afterbirth and discharges) should be burned; infected stalls should be cleaned and disinfected; the sheath of the herd bull should be cleansed with a disinfectant solution before and after service, and a separate clean bull should be used for heifers and clean cows."

The recommendations of the committee appointed by the Board of Agriculture and Fisheries of Great Britain to inquire into epizootic abortion of cattle (E. S. R., 22, p. 584) are critically discussed, and the results of other investigators are reviewed.

The complement fixation reaction in the diagnosis of contagious abortion of cattle, W. P. LARSON (*Jour. Infect. Diseases, 10 (1912), No. 2, pp. 178–185*).—The conclusions drawn from the study here reported are as follows:

"Contagious abortion of cattle in this country is caused by a micro-organism identical with that causing the disease on the European Continent. The complement fixation reaction is a reliable and accurate method of diagnosis. All animals do not contract the disease, even if in an infected herd and living under the same conditions as those which become infected. An animal may react positively, indicating that she has at some period been infected, and yet may not abort. This brings up the question of immunity, which will be the subject of a future study."

Filterable viruses, F. LOEFFLER (*Centbl. Bakt. [etc.], 1. Abt., Ref., 50 (1911), Beiheft, pp. 1–12*).—A survey of the diseases known to be caused by filterable viruses and with particular reference to foot-and-mouth disease.

Contributions to the etiology of foot-and-mouth disease, L. VON BETEGH (*Centbl. Bakt. [etc.], 1. Abt., Orig., 60 (1911), No. 1–2, pp. 86–90, pls. 2*).—The author observed in the contents of the vesicles cocci-like formations, the smallest of which were from 0.25 to 0.3 μ and the largest 1 μ in diameter. Many of these cocci were enclosed in leucocytes, and detected with the aid of the dark field illumination apparatus. They are held to be the causative organisms of foot-and-mouth disease.

Pure culture of Cytorrhyctes vaccinæ, J. SIEGEL (*Centbl. Bakt. [etc.], 1. Abt., Orig., 59 (1911), No. 4, pp. 406–415, pls. 2; abs. in Berlin. Tierärztl. Wchnschr., 28 (1912), No. 2, p. 30*).—In the blood and spleen of vaccine calves cocci were detected microscopically which could be cultivated only with difficulty. Enriching methods were almost always necessary in order to get them to grow on solid media. The cocci differentiate themselves from others by morphological and biological characteristics; for example, they grow best at 25° C. and produce minute cocci in the earlier stages. Under extraordinary conditions of nutriment the organisms are converted into the larger forms by the formation of mucous capsules. The cocci described, large and small, are similar to those known under the name of Cytorrhyctes (Guarnieri) which are obtained by inoculating the cornea of a rabbit with the lymph from cow pox.

Some additional remarks in regard to the detection of Cytorrhyctes cocci in foot-and-mouth disease, J. SIEGEL (*Berlin. Tierärztl. Wchnschr., 28 (1912), No. 2, pp. 27–29, figs. 3*).—The author reports the results of some further investigations with 4 hearts taken from animals affected with foot-and-mouth disease, 2 of which were fresh and the others recently preserved in formaldehyde. The Cytorrhyctes cocci were found in all instances.

A study was also made in regard to making the organisms more visible in their usual localities, that is, in the cells and nuclei of the skin. The best results were obtained with carbol-fuchsin (Ziehl). It was found that in each section examined in which lesions were present the characteristic cytorrhycte was present. The symptom complex of variola and foot-and-mouth disease are compared, and photomicrographs are given.

Report on the outbreaks of aphthous fever in Pennsylvania in 1908–9, L. PEARSON (*Penn. Dept. Agr. Bul. 211, 1911, pp. 72, pls. 15*).—This report has been previously noted from another source (E. S. R., 25, p. 381).

Combating foot-and-mouth disease, F. WULFF (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 41, pp. 745, 746*).—A criticism of the more recent methods proposed by Hoffmann for combating epizootics of foot-and-mouth disease in Germany.

Dysentery in calves, H. L. SOMMER (*Amer. Vet. Rev., 40 (1912), No. 5, pp. 626–632*).—The author has found polyvalent dysentery serum a good immunizing, as well as a reliable curative, agent, and recommends its use.

A new protective and curative medium against calf dysentery, PIORKOWSKI (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 38, pp. 689–691*).—Finding that yoghurt bacteria when given per mouth destroy many of the micro-organisms causing dysentery, the author prepared a yoghurt serum which is to be given in 10 cc. injections to calves directly after birth (passive immunity). He finds it still more rational to give the mothers Maya-yoghurt powder with the food in order to confer active immunity upon them and their offspring.

In regard to yoghurt and its prophylactic and therapeutic use against calf dysentery, R. STANDFUSS (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 39, pp. 705, 706*).—This is a comment on Piorkowski's work noted in the article above. The author points out that he, too, is working on the calf dysentery problem, but prefers to administer the highly active yoghurt organisms with the milk to the calves. The use of serum or feeding yoghurt powder is not considered of any value.

In regard to the use of yoghurt for calf dysentery, PIORKOWSKI (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 42, pp. 768, 769*).—This is a reply to Standfuss in which the author states that his purpose in giving yoghurt bacteria for the preparation of serum is to stimulate the production of opsonins.

In regard to yoghurt, STANDFUSS (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 45, p. 821*).—This is a polemic in which the author points out that the

injection of yoghurt organisms will stimulate the production of a serum (opsonins), which is specific for the yoghurt bacterium but not for the organism causing calf dysentery. Feeding the mother animal with yoghurt organisms will have no effect in regard to preventing dysentery in the offspring.

A new species of piroplasm found in the blood of British cattle, J. M'Fadyean and S. Stockman (*Jour. Compar. Path. and Ther., 24 (1911), No. 4, pp. 340–354, figs. 8*).—The authors describe the occurrence in the blood of British cattle of what appears to be a new species of piroplasm. The name *Piroplasma divergens* is applied to this species, the name being suggested by the wide angle which is commonly formed by the twin parasites in the same corpuscle.

In addition to cases in which the piroplasm in question was observed, there were others in which inoculation with similar material had either entirely negative results or was followed by a temperature reaction (103° to 106°) during the course of which no piroplasms were found. The experiments reported show that *P. divergens* is an inoculable piroplasm, and that the period of incubation after inoculation with blood varied from 4 to 8 days. The experiments also prove the persistence of the parasite in the blood of recovered animals. The blood of one bull was found to be infective 135 days after the piroplasms were last seen in it.

"In the case of one experiment an animal which had been inoculated 2½ years previously with the *P. bigeminum* (African strain), and had then reacted, became infected when inoculated with the *P. divergens*. We hope, however, at a later date to publish other experiments designed to show more conclusively whether the one piroplasm protects against the other or not.

"Lastly, special attention may be called to the fact that in the 2 cases in which affected animals (Heifers 3 and 208) were treated with trypanblue the drug appeared to have no serious effect on the *P. divergens*."

Immunization of South African born cattle against redwater from a practical standpoint, W. Robertson (*Agr. Jour. Union So. Africa, 3 (1912), No. 1, pp. 30–37, figs. 5*).—A detailed account of the methods now in use.

Observations in regard to the decrease and increase of streptococcic mastitis in barns, W. Rullmann (*Centbl. Bakt. [etc.], 1. Abt., Orig., 59 (1911), No. 5–7, pp. 500–509*).—In a barn where cleanliness was a feature no cow's milk showed a leucocyte content which would point to the presence of streptococcic mastitis. In another locality, in a barn having no modern methods of disinfection for either the animals or the milkers, a number of cows were found which had mastitis and others which had none. The uninfected animals had recently been introduced into the herd. The new animals were re-examined after a period of 3 months, and the results showed that these also were rapidly becoming mastitic. According to the author, soap and water should be freely used, as they are particularly destructive to the streptococcus.

Streptococcic infection in sheep, J. Wiemann (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 9 (1911), No. 3–4, pp. 233–256; abs. in Berlin. Tierärztl. Wchnschr., 28 (1912), No. 3, pp. 48, 49*).—The examination of some cadavers of sheep revealed the presence in 6 instances of streptococci in all organs of the body.

The author describes the symptoms of the disease from which these sheep died, and points out that the disease has its origin from infectious material which is present on the floor of the stalls. It can also be conveyed from sheep to sheep.

Glycogen and its relation to hemoglobinemia, Ohler (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 32, pp. 573, 574*).—Horses which were fed while at rest on a high carbohydrate diet eliminated sugar when put to work abruptly

in windy weather. This was due to a hydrolysis of the glycogen present in the muscles, particularly the muscles of the buttocks, causing a myositis—primarily due to the abstraction of water from the muscle—and a secondary acute nephritis. The author observed that when hemoglobinemia was diagnosed at the outset of the disease there was also a discharge of dextrose with the urine.

Twist or displacement of the pelvic flexure of the colon in the horse; differential diagnosis between that condition and simple impaction of the same portion of the bowel, together with remarks on the spontaneous reduction of twist and the comparative rarity of enteritis, H. C. REEKS (*Jour. Compar. Path. and Ther., 24 (1911), No. 4, pp. 306–328, figs. 8*).—The main object of the notes here presented is to point out that "in the great majority of our fatal cases of colic it is this displacement of some portion of the double colon that occasions the animal's end."

Treatment of pleuro-pneumonia of horses by autoserotheraphy, L. TEPPAZ (*Bul. Soc. Sci. Vét. Lyon, 1910, July, p. 229; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 35, pp. 626, 627*).—A 7-year-old horse was treated successfully with subcutaneous injections of its own pleural exudate, 15 cc. being given under the skin of the neck. The pleural fluid when sown on gelatin was found to contain the *Staphylococcus albus*, which was not very toxic for dogs.

Note on certain protozoan organisms observed in the rectal and cecal contents of the turkey and fowl, W. JOWETT (*Jour. Compar. Path. and Ther., 24 (1911), No. 4, pp. 303–305, fig. 1*).—A brief account is given of certain flagellated and spirally-formed organisms encountered in the course of examination of the fluid and semifluid rectal and cecal contents of the turkeys which formed the subjects of study of the blackhead disease (E. S. R., 26, p. 588).

Researches on the spirochetosis of fowls from Tunis and on Argas persicus, which transmits the disease, B. GALLI-VALERIO (*Centbl. Bakt. [etc.], 1. Abt., Orig., 61 (1911), No. 6, pp. 529–537, figs. 4*).—In investigations conducted at Lausanne, the author has found the fowl tick (*A. persicus*) from Kairouan to transmit the chronic form and those from Houmt-Souk (island of Djerba) to transmit the acute form of spirochetosis. The author considers this disease of poultry to be caused by a single spirochete (*Spirochæta anserina* of Sacharoff).

In studies of the biology of the fowl tick, the author found that this parasite had a marked predilection for the blood of birds but that it may at times even attach to cold-blooded animals if their skin be warmed.

Warty typhilitis of the pheasant and the parasite which causes it (Heterakis isolonche), A. LUCET and A. HENRY (*Bul. Soc. Cent. Méd. Vét., 88 (1911), No. 14, pp. 320–333, figs. 15*).—Pathological and systematic studies are reported and a bibliography of 7 titles is appended.

RURAL ENGINEERING.

The present stage of irrigation development and a forecast of the future, S. FORTIER (*Irrig. Age, 27 (1912), No. 4, pp. 128–130*).—This article briefly reviews the development of arid regions during the past 20 years by irrigation, discussing government aid to irrigation, the importance of irrigation to the Western States, money invested in irrigation works, agencies in irrigation development, the geographic distribution of irrigation enterprises, and improvement in irrigation practice. In order to safeguard all interests, the author advocates the speedy settlement of lands now irrigated, the aiding of settlers on irrigated farms, a readjustment of land values, the more economical use of appropriated water supplies, better state irrigation laws, and more efficient administrative systems.

The irrigation situation, G. M. BULL (*Engin. Rec., 65 (1912), No. 8, pp. 222, 223*).—The author discusses the present system of financing public irrigation projects by bond issues to private investors, and states that in the majority of cases the bonds have been considered simply as a means of securing money, with practically no regard as to their having behind them sufficient property to safeguard the investor. He concludes that the entire system of financing should be so changed that the bonds be held by the underwriters until such time as the water is actually applied to the land and their value ceases to be speculative.

Underdrainage of alluvial lands, J. A. HARMAN (*Engin. Rec., 65 (1912), No. 8, pp. 214, 215*).—The need of underdrainage for flat or rolling uplands and of both surface drainage and underdrainage for the adjacent lowlands is pointed out. The general soil texture and topography are discussed in their immediate relations to uplands and alluvial lands, and it is stated that these are the 2 factors to be especially considered in designing underdrainage for alluvial lands.

Tests of concrete drain tile, A. O. ANDERSON (*Engin Rec., 65 (1912), No. 11, p. 308, fig. 1*).—Results of tests of concrete drain tile conducted at the engineering experiment station at the Iowa State College are reported.

When the increments of load were added uniformly and continuously the strain was approximately proportionate to the stress, but on allowing a few minutes' time to elapse between increment additions, it was found that near the breaking point the pipe would rupture under a considerably lower load. These tests advance the theory that fatigue of concrete is an explanation of failure under load, and they also show that the deformation of drain tile is so small before fracture occurs that but little support can be secured from the tamping of earth at the sides of the pipes when placed in the trench.

Camden chert as a road-making material in Tennessee (*Engin. Rec., 65 (1912), No. 9, p. 250*).—Camden chert is considered a promising road material in Tennessee. Its chemical composition of quartz, limestone, and clay allow of the formation of a good bond, its physical texture allows it to break into small, sharp fragments when blasted, it is easily handled after blasting, and it is economically distributed in the State.

A novel road machine, A. B. MCDANIEL (*Engin. News, 65 (1912), No. 10, p. 460, figs. 2*).—This article briefly describes a machine for the maintenance of country roads. It consists of an iron bar framework with a steel, concrete-filled roller in the rear, guide trucks in front, and a scraper suspended in the center. The scraper and roller have an effective width of 7 ft., and the total weight of the machine and operator is approximately 1 ton. The scraper is controlled by hand levers from the operator's seat over the roller. It is claimed that about 3 miles of rough earth road and 5 miles of average road may be put in first-class condition in a 10-hour day at a cost of $6.

Uses of the traction engine in highway grading, G. H. MAINWARING (*Engin. Rec., 65 (1912), No. 8, p. 223*).—These are notes from experiments conducted by the highway commissioner of Richland County, Wis., with traction engines for highway grading. The advantages over horsepower pointed out are the ease of operation, steadiness of motion, better centered and controlled power, and greater efficiency. The notes on a 16-horsepower engine show a daily expense of $14, the same as for 4 teams, but the engine does daily from 40 to 75 per cent more work.

The rural motor vehicle, E. L. FERGUSON (*Sci. Amer., 106 (1912), No. 6, pp. 133, 140, figs. 5*).—This article points out and discusses the advantages of the motor vehicle for the social and commercial advancement of rural life.

The care of dry batteries (*Farm Machinery, 1912, No. 1066, p. 26*).—This article comments briefly on the care that should be taken to prevent short circuits and bad connections in dry batteries, and points out the necessity of keeping the coil in good condition and the switch and commutator points clean in order to get the best service from engines that operate from the dry cell.

Making the "tractioneer," L. W. ELLIS (*Sci. Amer., 106 (1912), No. 6, pp. 126–128, figs. 8*).—Attention is called to the rapidly increasing demand for men skilled in the operation, care, and upkeep of steam and gas tractors for agricultural purposes, men who have a combination of common sense, average engineering skill, some farm experience, and good executive ability. It is noted that short courses of instruction along these lines are being introduced into the agricultural colleges and that tractor manufacturing companies are conducting schools for the same purpose in their factories.

The economics of silo construction of permanent materials (concrete and clay tile); construction methods and costs, M. L. KING (*Engin. and Contract., 37 (1912), No. 10, pp. 256, 257, figs. 2*).—In view of the increasing demand for silos the author discusses the economic advantages of building them of permanent materials. A brief outline of the essentials in the materials and details of construction of masonry silos is also given.

Silage and concrete silos (*Wyo. Farm Bul., 1 (1911), No. 5, pp. 69–72, figs. 2*).—This article discusses the use of silage and the need for solid-wall silos, and gives a table for use in deciding on the size of silo. Essential details for the location, foundation, and general construction of reenforced concrete silos are given with a bill of materials and costs.

Farm equipment: Buildings and machinery, P. MCCONNELL (*London and New York, 1910, pp. XV+108, pl. 1, figs. 14*).—This handbook of information for the farmer deals principally with the methods of laying out the farm and its homestead, the design and construction of farm buildings and their appurtenances, sanitation and drainage, farm machinery, and the different types of farm motors.

RURAL ECONOMICS.

Tenancy in the North Central States, B. H. HIBBARD (*Quart. Jour. Econ., 25 (1911), No. 4, pp. 710–729, figs. 2*).—This article presents a discussion of many phases of the tenancy problem in the North Central States, showing that tenancy is not a constant and uniform factor throughout the United States, but varies according to geographical divisions and local influences.

A close parallelism is noted between the value of land per acre and the percentage of tenancy, as shown in the following table prepared from data reported in the thirteenth census:

Value of land and percentage of tenancy.

State.	Value per acre.	Per cent of tenancy.	Rank in value.	Rank in tenancy.	State.	Value per acre.	Per cent of tenancy.	Rank in value.	Rank in tenancy.
Illinois	$94.90	41.4	1	1	Missouri	$41.76	29.9	7	6
Iowa	83.00	37.8	2	3	Minnesota	37.00	21.0	8	9
Indiana	62.00	30.0	3	5	Kansas	35.50	36.8	9	4
Ohio	53.30	28.4	4	7	South Dakota	34.70	24.6	10	8
Wisconsin	43.30	13.9	5	12	Michigan	32.00	16.0	11	10
Nebraska	41.84	38.2	6	2	North Dakota	25.70	14.3	12	11

A comparison of groups of counties within a State brings out this relationship even more closely. It is further noted that there is a corresponding rela-

tion between the increase of tenancy and the increase in the size of the farm, also in the type of farming. Maps illustrate the increase of tenancy in the production of corn, this being attributed more to the inability of the tenant to enter the more profitable business of stock raising than to any other cause. The author concludes, "that the system of farming is a factor equally important, if not more important, than the price of land in turning the scale in favor of ownership or in favor of tenancy."

Tenancy in the North Atlantic States, B. H. HIBBARD (*Quart. Jour. Econ., 26 (1911), No. 1, pp. 105–117*).—This article contrasts the status of tenancy in the North Atlantic States with that of the North Central States noted above, following very much the same method. Further discussions relate to the percentage of selected crops grown by tenants in different States, and the relation between dairy farming, live stock raising, and fruit growing and tenancy.

A general decrease in tenancy is noted in the North Atlantic States during the past decade, this being attributed to a combination of causes. "The most important of these are, first, the low price of land per acre; second, a set of circumstances resulting in comparatively small farms, these two facts combining to give a low value to the farm as a unit; third, the relatively small amount of farming such as lends itself easily to a system of tenancy, and in its stead a type requiring ownership of the land in order to insure good results."

Ownership or tenancy of agricultural land, edited by W. BROOMHALL (*Country Gent. Estate Book, 1911, pp. 74–79*).—This article presents a discussion of the advisability, from an agricultural point of view, of changing from a tenant system of farming to that of occupying ownership, showing that there were in Great Britain on June 4, 1909, 62,063 holdings owned or mainly owned, and 447,108 holdings rented or mainly rented.

Concrete illustrations are given to show that a change from position of tenant to that of owner would not be beneficial financially to the average farmer in Great Britain, because of the larger amount of capital required. It is noted, however, that the conditions of climate, mode of life, and similar factors should be considered, as these may be such in some countries as to warrant ownership in preference to tenancy.

A method of making a social survey of a rural community, C. J. GALPIN (*Wisconsin Sta. Circ. Inform. 29, pp. 11, figs. 2*).—This circular outlines a method for making a social survey of any rural community and mapping the results. The work of such a survey is described as an inventory of the important social activities of the community, displayed in such a way as to show how far every home is participating in the social life of the community. It is maintained that such a survey is calculated to lead toward a readjustment of the social structure of the community, and to produce a balanced social life that will fit the whole community and meet its larger needs.

Agricultural societies—wages of farm laborers [in Jamaica], J. D. DREHER (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 14, pp. 276, 277*).—The work of the Jamaica agricultural society, which has affiliated with it 73 branch societies, is described, as that of investigations, holding conferences, offering premiums, distributing seeds and circulars of instruction, making appropriations for lectures, practical demonstrations, supporting 4 traveling instructors, and publishing a monthly journal with a circulation of 4,000 copies.

Although there is increased interest in agricultural improvement and general prosperity of the island, farm wages are as a rule low, usually 36 cts. a day for men and 24 cts. for women, without meals. "In recent years many laborers have gone from Jamaica to the Canal Zone, Costa Rica, and other places to get better wages."

Irish agricultural laborers, 1910–11, T. BUTLER (*Dept. Agr. and Tech. Instr. Ireland, Agr. Statis. 1910–11, pp 37*).—Notes and statistics relating to the Irish migratory agricultural laborers in 1910 and also to the wages of agricultural laborers in Ireland in 1910–11 are here presented.

The number of such laborers who go to England and Scotland each year for temporary employment is shown to be steadily decreasing, being 18,500 in 1910, as compared with 20,500 in 1909, and 22,500 in 1908. Out of 10,225 migratory laborers in 1910 about whom information was obtained, 7,789 did not hold any land, 2,153 had holdings of over 5 acres, and 283 had holdings not exceeding 5 acres. Of the landless migratory laborers 5,957 were sons and daughters of farmers and worked on the farm when at home.

The agricultural obligation of the South, JAMES WILSON ET AL. (*Proc. Ann. Conv. South. Com. Cong., 3 (1911), pp. 396–489*).—Addresses delivered at the Southern Commercial Congress, Atlanta, Ga., in March, 1911, are presented. That of the Secretary of Agriculture points out the agricultural possibilities of the South and the progress made within the last few years by the assistance of this Department. Other speakers discussed agricultural industries of the South, the dependence of agricultural life upon conservation of the soil, the South's rainfall and temperature in relation to southern agricultural monopolies, the cereals of the South, and diversification in southern agriculture.

Prosperous Georgia: The ideal home for all classes, J. T. DERBY and R. F. WRIGHT (*Bul. Ga. Dept. Agr., 1910, No. 52–B, pp. 218, pls. 20*).—In addition to a description of farm land in Georgia by counties, with prices, this bulletin presents statistics as to acreage and production of cotton in the State by counties from 1790 to 1910; statistics of other agricultural products from 1899 to 1910; and a comparative summary as to the yield and value of the leading crops for 1909.

[Agricultural statistics and chattel mortgages in Province of Ontario], J. S. DUFF (*Ann. Rpt. Bur. Indus. Ontario, 1910, pp. 47*).—This report presents statistics as to assessed rural areas, field crops, ratio of areas under each crop, market prices, live stock, wool, values of farm property, chattel mortgages, etc.

The chattel mortgages against all occupations to secure existing debts in 1910 numbered 12,490 amounting to $31,108,900, while those against farmers numbered 6,196 amounting to $2,658,283.

Agricultural statistics, 1911, R. H. REW (*Bd. Agr. and Fisheries [London], Agr. Statis., 46 (1911), No. 1, pp. 97, fig. 1*).—Notes and statistics are here given showing that during the last 10 years in Great Britain 378,000 acres, of which 323,000 were under cultivation, have been withdrawn from farming and devoted to some other use. It is suggested that while this decrease in the farming area may represent the gradual abandonment under economic pressure of the least profitable portion of the land, broadly speaking it is to be attributed mainly to the extension of towns and the demand for more land for residential, manufacturing, and other purposes. According to the preliminary report on the 1911 census, urban areas in England and Wales alone showed an increase of 166,710 acres since 1901.

An increase in the number of small holdings from 1 to 50 acres is noted from 288,802 in 1910 to 292,488 in 1911. The total number of holdings is shown to be 513,259, of which 60,217 are owned by their occupiers. Of the latter number 43,239 are classed as small holdings.

Other data are given as to acreage yield, etc., of the crops, live stock, value of land, etc.

Imports of agricultural produce in 1910, edited by W. BROOMHALL (*Country Gent. Estate Book, 1911, pp. 309, 310*).—The foodstuffs imported into the United

Kingdom in 1910 were valued at £189,433,000, a decrease of £2,172,000 over 1909. This decrease is accounted for in part by the reduction in the price of wheat and grain products imported. A decrease in the number of live cattle from the United States is reported, but an increase in the total imports of dead meat, the majority of which was from Argentina.

Only 427 live sheep were imported, but dressed carcasses weighed 5,406,000 cwt. The imports of bacon are said to be lower than at any time since 1894, the chief country showing a decrease being America, where the imports have decreased about 60 per cent.

Other data are given as to diary products, grains, fruits, wool, etc.

The course of prices at home and abroad, 1890–1910, R. H. Hooker (*Jour. Roy. Statis. Soc., 75 (1911), No. 1, pp. 1–50, figs. 7*).—A paper read before the Royal Statistical Society November 21, 1911, in which the author discusses and illustrates, by means of diagrams, the system of index-numbers in showing changes in the course of prices of commodities generally, data compiled by several authors showing the trend of prices since 1890, and the factors which have caused some marked changes in recent years. A discussion follows the paper.

Foreign crops, January, 1912, C. M. Daugherty (*U. S. Dept. Agr., Bur. Statis. Circ. 28, pp. 16*).—Notes and statistics regarding the area and production of cotton in Egypt, 1900–1911, of specified crops in Canada, 1910–11, and of cereals, hay, potatoes, etc., in Ireland, 1910–11, together with final estimates of the crops of France, 1908–1910, and other data pertaining to agricultural crops and live stock in foreign countries, are here presented.

It is noted that the development of cooperation in the sale for export of certain animal products in Denmark has given an effectual stimulus to the growth of the live stock industry, notably in the raising of swine and chickens, their number having increased 77 and 107 per cent, respectively, between 1893 and 1909.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 14 (1912), No. 2, pp. 9–16, figs. 6*).—Notes and statistics as to the number and value of live stock, meat consumption per capita by countries, monthly prices of live stock and wool for 1910–11, weight of live stock when marketed, poultry and bees in the United States in 1910 and receipts of eggs at 7 of the leading markets, 1891–1911, slaughtering and meat packing, and range of prices of agricultural products at important markets, and other data, are here presented.

AGRICULTURAL EDUCATION.

Agricultural education, R. J. Huergo (*La Enseñanza Agricola. Buenos Aires, 1909, pp. 130*).—This paper, presented at the first Pan-American Scientific Congress at Santiago, Chili, on December 25, 1908, by the chief of the division of agricultural instruction, gives a detailed account of the system of agricultural education in Argentina, together with its rules and regulations.

Establishment of the farm and home management school in Austria (*Land u. Forstw. Unterrichts Ztg., 25 (1911), No. 1, pp. 1–16*).—In this article a very complete account is given of the conditions leading up to the establishment of the first farm and home management school in Austria, which was opened at Otterbach, near Schärding, in the fall of 1911, and of its buildings and equipment, rules and regulations, 2-year theoretical and practical course of instruction, and staff of instructors. In connection with this school is a rural housekeeping school with a 1-year course of instruction.

[Agricultural and forestry instruction in Austria] (*Land u. Forstw. Unterrichts Ztg., 23 (1909), No. 1–2, pp. 165+LVI*).—This report contains (1)

the following special articles: Awakening and Increasing the Pleasure of Learning by L. Fleischner, Individualizing the Work of the Teacher in Special Agricultural Schools by E. Vital, Concerning the Reorganization of Agricultural Secondary Schools (Mittelschulen) by R. Wessely, Elementary Forestry Instruction with Special Reference to the Austrian Alpine Regions by K. Pusch, the Agricultural Winter School and Its Plan of Instruction by H. Knesch, New Rules and Regulations for the Agricultural Winter Schools in Bohemia and for the Permanent Housekeeping Courses at These Schools; (2) statistical information and miscellaneous notes concerning the agricultural and forestry institutions in Austria in 1908–9; and (3) other data.

[Agricultural and forestry instruction in Austria and other countries] (*Land. u. Forstw. Unterrichts Ztg., 25 (1911), No. 1, pp. IV+108*).—This number includes among other data special articles on The Establishment of the Farm and Home Management School in Austria; On What Momentum Does the Success of Agricultural Instruction Depend, by V. Schumy; Promoting Nature Protection in our Vocational Schools, by Bruno Schweder; Agricultural and Forestry Instruction in Bosnia and Herzegovina, by W. Slawkowsky (see below); Concerning Horticultural Schools in Belgium, by Dr. Stanislaus R. v. Ramult; and Agricultural Instruction in the Canton of Bern, by Dr. Leopold Freih. v. Hennet.

[Agricultural and forestry instruction in Austria and other countries] (*Land u. Forstw. Unterrichts Ztg., 25 (1911), No. 2, pp. IV+109–219+LXIV*).—This report includes 2 special articles noted below and 1 by V. Schumy entitled On What Momentum Does the Success of Agricultural Itinerant Instruction Depend; statistical information concerning agricultural and forestry instruction in Austria in 1910–11; and other data.

The statistics show that in 1910–11 there were 219 agricultural and forestry institutions in Austria, an increase of 5 over the preceding year. They include 3 high school institutes, 3 agricultural academies and 1 brewing academy, 8 agricultural and 5 forestry high schools, 2 high schools for viticulture, fruit culture, or horticulture, 42 farm schools, 88 agricultural winter schools, 11 elementary forestry schools, 24 dairy and housekeeping schools, 28 elementary special schools for horticulture, fruit culture, viticulture, vegetable, flax, hop, and meadow culture, alpine farming, or apiculture, and 2 brewing and 2 distillery schools.

Agricultural and forestry instruction in Bosnia and Herzegovina, W. Slawkowsky (*Land u. Forstw. Unterrichts Ztg., 25 (1911), Nos. 1, pp. 47–59; 2, pp. 119–132*).—This is a detailed account of the system of agricultural instruction in Bosnia and Herzegovina, including the Training School for Teachers, at Sarajevo, in which agricultural instruction is obligatory; elementary public schools, in which systematic agricultural instruction is given; 4 farm and fruit culture schools located, respectively, at Ilidez near Sarajevo in Bosnia, Modric in northern Bosnia, Livno on the Dalmatian border, and Gacko in Herzegovina, which offer 3-year and 1-year courses of instruction and have experiment stations connected with them; itinerant agricultural instruction and special courses; and the forestry school at Sarajevo with a 3½-months course for forest overseers and a 2-year course.

Report on agricultural instruction for 1908–1910 (*Dept. Landb., Nijv. en Handel, Verslag en Meded. Dir. Landb. [Netherlands], 1911, No. 3, pp. VIII+197*).—This includes the Royal Agricultural, Horticultural, and Forestry High School at Wageningen, the Royal Agricultural School at Wageningen, the Royal Dairy School at Bolsward, the agricultural and forestry winter schools, and the Gerard Adriaan van Swieten Horticultural School at Frederiksoord. Detailed

information is also given on itinerant courses in agriculture and horticulture; courses for agricultural and horticultural teachers; agricultural instruction in the army; special courses in animal husbandry, horse breeding, and horseshoeing; work of the agricultural, horticultural, and dairy instructors and of state subsidized associations; and agricultural instruction for women and girls on the farm.

Agricultural instruction in the Netherlands, S. R. v. RAMULT (*Land u. Forstw. Unterrichts Ztg., 25 (1911), No. 2, pp. 148–192*).—This article gives a detailed account of the system of agricultural instruction in the Netherlands.

Education for rural life, O. H. BENSON (*Proc. Conf. Ed. South, 14 (1911), pp. 171–189*).—In 1907, before any attention had been given to rural life education in the Wright County, Iowa, schools, the author selected 34 rural schools in the county and inquired of the boys and girls above the fourth grade as to their intentions as to farm life when grown up. Of the 164 boys, 157 replied that they would have nothing whatever to do with farming, and 163 of the 174 girls made a similar reply.

After 3 years of instruction in elementary agriculture and home economics by effective correlation, organizing rural life clubs, and eventually by the teaching of elementary agriculture and home economics in regular and daily class work, the questionnaire was repeated in the same schools. Out of 174 boys, 162 of them answered that they intended to be farmers, and 161 of the 178 girls answered that they planned to be home-keepers, farmers, etc. Of the remaining boys and girls all but 4 were in advanced grades, and from 13 to 15 years of age.

Problems in the experimental pedagogy of elementary agriculture, G. A. BRICKER (*Jour. Ed. Psychol., 3 (1912), No. 1, pp. 29–34*).—The pedagogical problems discussed are (1) the portions of agriculture adaptable for use in the elementary school, (2) the grades in which it may be taught, (3) the applicability of prevailing pedagogical principles to the efficient teaching of elementary agriculture, (4) shall experience in practical agricultural methods precede the study of the scientific principles involved, (5) the pure science *vs.* the economic-applied science method of approach, and (6) the feasibility of organizing and teaching a series of "agricultural" habits in the elementary school.

Agriculture, J. T. JOHNSON (*Normal School Quart. [Macomb, Ill.], 1910, No. 8, pp. 38, pls. 12, figs. 18*).—This number outlines an advanced course in agriculture at the Western Illinois State Normal School, which requires from 2 to 3 double laboratory periods each week, and recitations alternating with the laboratory work. The laboratory work provides for the study of the physical and chemical properties of the soil; soil fertility, including fertilizers, the manner of mixing fertilizers for crop production, and experimental practice on the soil experiment field, which is located on the campus; dairying; poultry and farm animals; feeding and mixing rations; and farm management. One year each of physics, chemistry, and biology are prerequisites to this course.

Productive farming, K. C. DAVIS (*Philadelphia and London, [1911], pp. VIII+357, pl. 1, figs. 224*).—It has been the author's aim to furnish a book which would interest the children in both rural schools and graded village and city schools in farming. In an elementary way he introduces the reader to the fundamentals of plant and animal production and farm management. It is also shown how useful Farmers' Bulletins are when used in the proper way. The book is gotten up in the form of a text-book with review questions at the end of each chapter. The appendixes contain tables and formulas to be used in farming.

Publications of the Department of Agriculture classified for the use of teachers (*U. S. Dept. Agr., Div. Pubs. Circ. 19, pp. 36*).—This is a revision of Circular 94 of this Office (E. S. R., 22, p. 693).

MISCELLANEOUS.

Twenty-third Annual Report of Colorado Station, 1910 (*Ann. Rpt. Bd. Agr. Colo., 32 (1910), pp. 13, 68–106*).—These pages contain a financial report for the fiscal year ended November 30, 1910, a report of the director on the work and publications of the station, and departmental reports, the experimental features of which are for the most part abstracted elsewhere in this issue.

Twenty-third Annual Report of Kentucky Station, 1910 (*Kentucky Sta. Rpt. 1910, pp. XX+29+338, pls. 14, figs. 14*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1910, a report of the director on the work of the station during the year, reprints of the Report of the Director on the Enforcement of the Food and Drugs Act for the Years 1908 and 1909, and of Bulletins 147 to 152, previously noted, and reports of analyses of mineral waters and meteorological data, abstracted elsewhere in this issue.

Biennial Report of Missouri State Fruit Experiment Station, 1909–10 (*Missouri Fruit Sta. Rpt. 1909–10, pp. 12, pls. 2*).—This includes a financial statement for the biennial period ended December 31, 1910, and a report of the director on the work of the station for the biennium, and its present needs.

Director's report for 1911, W. H. JORDAN (*New York State Sta. Bul. 342, pp. 401–420*).—This contains the organization list and a review of the work and publications of the station for the year.

Twenty-fourth Annual Report of South Carolina Station, 1911 (*South Carolina Sta. Rpt. 1911, pp. 65*).—This contains the organization list, a report of the director on the work of the station, a financial statement for the fiscal year ended June 30, 1911, departmental reports, of which that of the entomologist is noted on page 654, and a number of special articles abstracted elsewhere in this issue.

Annual Report of South Dakota Station, 1911 (*South Dakota Sta. Rpt. 1911, pp. 32*).—This contains a report by the director on the organization, work, and publications of the station, a list of exchanges, a financial statement for the fiscal year ended June 30, 1911, and departmental reports.

Publications on hand (*Vermont Sta. Circ. 8, pp. 6*).—A list is given of the publications of the station which are available for distribution.

Annual report for 1911 of the Rothamsted Experiment Station, A. D. HALL (*Rothamsted Expt. Sta., Harpenden, Ann. Rpt. 1911, pp. 23*).—This includes a brief history of the station, a review of the work and publications of the year, and tables summarizing the principal results in 1911.

Reports of the experiment stations of Austria (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 4, pp. 321–710, pls. 4*).—These are the reports for 1910 of the activities of the various agricultural, chemical, seed control, botanical, and food laboratories of Austria.

Yearbook of the Chief Administration of Land Improvement and Agriculture of the Bureau of Agriculture (*Ezheg. Dept. Zeml. [Russia], 1910, pp. LXXIII+727, pls. 61, figs. 36*).—This volume contains a survey of the activities of the Russian Bureau of Agriculture and its various experiment stations for the year 1910, and 19 monographs on various agricultural questions and branches of industry connected with agriculture, among them the following: The chief agricultural expositions and congresses in Russia in 1910;

wheat and its cultivation in Russia; origin of the superphosphate industry on the Volga; the Russian beet sugar industry; pigeon raising as a branch of agriculture; the Palibinka Government breeding station for Simmental cattle; outline of the distribution of the most important injurious animals and fungus diseases of plants in Russia in 1910; and a historical sketch of the Imperial Nikita Garden. Supplements are added giving statistics of crops and live stock in Russia in 1910, of exports from Russia in 1909 of agricultural products, of imports of agricultural products and machinery into Russia in 1909, a list of publications by the Bureau of Agriculture in 1910, and a list of agricultural education institutions.

The Imperial Department of Agriculture for the West Indies (*West Indian Bul., 11 (1911), No. 4, pp. 231–450*).—This number is devoted to an extended résumé of the work of the Imperial Department of Agriculture for the West Indies and a discussion of problems awaiting solution.

Farm and garden rule-book, L. H. BAILEY (*New York, 1911, pp. XXIV+587, figs. 22*).—The present work has been prepared to cover a much wider field than The Horticulturist's Rule-Book (E. S. R., 7, p. 131), which it supersedes. It is offered as a manual of ready rules and reference with recipes, precepts, formulas, and tabular information for the use of general farmers, gardeners, fruit-growers, stockmen, dairymen, poultrymen, foresters, rural teachers, and others in the United States and Canada.

Agricultural laws of Nebraska (*Ann. Rpt. Nebr. Bd. Agr., 1910, pp. 140–267*).—The text of the various Nebraska laws pertaining to agriculture is given.

NOTES.

Georgia College.—Dr. William Bradford of Cedartown, J. K. Giles of Atlanta, M. C. Gay of Augusta, J. Walter Hendricks of Savannah, G. V. Cunningham of Tifton, and C. M. James of Columbus, have been appointed district corn club organizers in cooperation with this Department.

Idaho University.—H. A. Wadsworth, assistant in forestry, has resigned to accept a commission in the United States Army and has been succeeded by E. W. Cook of the Forest Service of this Department.

The students' stock judging teams of the school of agriculture won first and third places in an intercollegiate contest at the Pacific Northwest Live Stock Show at Portland, March 18–20.

Illinois University and Station.—The college of agriculture will offer the coming year a series of extension schools of one week each, beginning in October and ending in February, each school to be conducted by a faculty of five. A. W. Nolan, associate professor of agricultural education of the West Virginia University, has been appointed assistant professor of agricultural education in the extension department. H. W. Anderson, assistant in pathological floriculture, has resigned to become head of the department of botany at Wabash College.

Miss Catherine McIntyre, secretary of the station, died February 25. The scope and value of her services are indicated in the following extracts from resolutions adopted by the station staff:

"The death of Miss Catherine McIntyre severed from the staff of the agricultural experiment station of the University of Illinois one who had been associated with this institution since it was established in 1888. While her official duties did not make her widely known, yet her service to the public, as secretary of the experiment station, was invaluable to the State. . . . To systematize the bookkeeping in the use of half a million dollars a year, distributed in more than sixty different funds, to supervise the publication and distribution of all experiment station bulletins, circulars, and reports in editions reaching as high as sixty thousand copies, to organize and maintain a clerical force in the general office, and to advise and assist in the management of all departmental offices, was the work of Miss McIntyre; and into this service she brought accuracy of accounting, proficiency in her knowledge of the English language, and rare tact and genuine helpfulness, both to those employed under her direction and to her official superiors."

Purdue University and Station.—R. C. E. Wallace has been appointed instructor in agronomy vice C. E. Craig, whose resignation has been previously noted. The hog cholera serum plant is being doubled in capacity.

Iowa College.—Dr. Raymond A. Pearson, formerly commissioner of agriculture in New York, has accepted the presidency of the institution. He will visit a number of agricultural institutions in Europe during the summer and enter upon his duties in the fall.

Massachusetts College.—The fourth annual farmers' week attracted an attendance of 1,200, an increase of 25 per cent over the preceding year. Lectures

and demonstrations were offered in farm crops and farm manures, dairying and animal husbandry, horticulture, and home economics.

The Grinnell stock judging pavilion, named in honor of the late Hon. James S. Grinnell, who was for 22 years a trustee of the college, was dedicated March 13. The dedicatory address was by Dr. Carl W. Gay, of the University of Pennsylvania, upon the subject The Livestock Industry of New England.

A. J. Norman, extension instructor in pomology, has resigned to engage in practical fruit growing.

Missouri University and Station.—The governing board of the university has authorized the appointment of a limited number of county administration men who will devote their entire time to helping the farmers in the community in which they are located. The college of agriculture is to pay 25 per cent of each man's salary, and the county or community receiving his services the balance. The men will be entirely under the direction of the college and they will be located where the most interest is shown and the best support promised.

The establishment of 4 additional experimental fields has been authorized, to be located in northeast and southeast Missouri and the Ozarks.

Arrangements have been perfected for a permanent forestry summer camp as a part of the required work in the department of forestry. The camp will be located in the Ozark region in the midst of 50,000 acres of native forest lands. Attention will be given to timber estimating, tree planting, lumbering, forest surveying, the laying of logging roads, trails, and fire lines, and the making of lumber and forest working plans.

W. J. Hendrix, assistant in agronomy, has resigned. H. G. Lewis, E. C. Hall, and L. V. Davis have been appointed assistants in the soil survey. C. B. Hutchison of the department of agronomy has been granted leave of absence for the next academic year.

Nebraska Station.—The station has purchased a 160-acre farm at Culbertson for demonstration purposes, and will secure immediate possession. A portion of the land will be used for dry-farming work and the balance for cropping under irrigation. Homer L. Nye has been appointed foreman.

Nevada Station.—President J. E. Stubbs has resigned as director of the station, and has been succeeded by Gordon H. True.

New Jersey Stations.—A tract of 135 acres of land, adjoining the college farm, has recently been purchased for dairy experiments. Harry B. Weiss has been appointed acting state entomologist and Herman H. Brehme acting executive officer in charge of mosquito extermination work.

New Mexico College and Station.—The post-office address of the institution was changed on April 1 from Agricultural College to State College.

New York State Station.—Richard F. Keeler, a graduate of the University of Michigan, has accepted a position as assistant chemist in soil work and entered upon his duties early in April.

Ohio Station.—The plan of cooperative management of the farms belonging to the Institution for the Feeble Minded and the State Penitentiary has been so modified that the station now exercises merely an advisory function. J. W. Klinefelter has resigned the position of superintendent.

W. O. Gloyer has resigned as assistant botanist to accept an appointment as associate botanist at the New York State Station, and has been succeeded by J. B. Demaree, who will be assigned to the study of diseases of truck and forage crops. Don C. Mote has been appointed assistant in animal husbandry to conduct investigations in animal parasitology.

Pennsylvania College and Station.—W. A. Cook has resigned as assistant in dairy husbandry to assume the management of a farm in Illinois.

Porto Rico Sugar Growers Station.—A series of meetings known as "planters' conferences" is being held every one or two months, at convenient points on the island. Addresses are made by the members of the station staff, with an opportunity for discussion by the planters. It is hoped in this way to bring the work of the station directly to the planters and to obtain from them their viewpoint, experience, and suggestions. The first conference was held at Ponce, March 13, with the subject insects and diseases of sugar cane.

Clemson College and Station.—Recent appointments include M. S. Gardiner as assistant professor of agronomy and farm mechanics, T. F. Jackson as extension assistant in animal husbandry, T. W. Tate as herdsman, H. C. Eagerton as extension assistant in entomology, and W. F. Burleigh as assistant state veterinarian.

South Dakota College and Station.—An appropriation has been made by the legislature of $100,000 for the erection of a building to be known as the agricultural and administration building. This is the largest appropriation ever made for a single building at any of the seven state educational institutions. Plans for the new structure are being perfected. It is expected to provide ample room for several members of the station staff, as well as for a general student assembly room.

Washington Station.—W. J. Young of the microchemical laboratory of this Department has been appointed assistant horticulturist and has entered upon his duties.

West Virginia University and Station.—Samuel B. Nuckols has been appointed instructor in agronomy and assistant agronomist, and E. W. Sheets assistant in extension work in charge of boys' and girls' agricultural clubs in cooperation with this Department.

Wyoming University.—Dr. Charles O. Merica has tendered his resignation as president, to take effect July 1.

Fifth Graduate School of Agriculture.—The prospectus of the fifth Graduate School of Agriculture has recently been issued. This session will be held at the Michigan Agricultural College, July 1–26.

The usual public exercises in connection with the opening of the school will be held July 3, when addresses will be given by President J. L. Snyder and Dean R. S. Shaw, of the Michigan College, President W. E. Stone and Dr. H. P. Armsby, representing the Association of American Agricultural Colleges and Experiment Stations, and Dr. A. C. True, of this Office, who will again serve as dean of the school.

The instruction offered will be given in seven main lines—soils and plant physiology, animal physiology, agronomy, horticulture, animal husbandry and poultry, rural engineering, and rural economics and farm management. The course in soils and plant physiology will include such matters as the part played by the soil solution in the nutrition of plants, the relation of the physiology of plants to the soil problem, colloids in relation to soil fertility, and soil bacteriology. In the course in animal physiology will be considered such topics as the physiology of the cell, the physiology of reproduction, the biology of sex, and various phases of nutrition investigations. The courses in agronomy and in horticulture will embrace lectures on plant breeding and physiological factors in the breeding and adaptation of plants, problems in field crop production, and the transportation, handling, and storage of fruit. In animal husbandry there will be one series of lectures on beef and dairy cattle running throughout the four weeks and another series divided equally in point of time between swine husbandry and poultry husbandry. Under rural engineering special attention will be given to rural sanitation, machinery, road making, drainage, and irrigation.

The conferences thus far arranged, with their leaders, are as follows: Agricultural Research, Dean H. L. Russell, of the University of Wisconsin; College Instruction in Agriculture, Dean T. F. Hunt, of the Pennsylvania College; Secondary Instruction in Agriculture, Professor W. H. French, of the Michigan College, and D. J. Crosby, of this Office; and Extension work, Director L. H. Bailey, of Cornell University, and Superintendent G. I. Christie, of Purdue University.

The faculty will include about 50 members of the staff of this Department and various agricultural colleges and experiment stations, and the following additional specialists: A. D. Hall, director of the Rothamsted Station, F. H. A. Marshall, professor of agricultural physiology, Cambridge University, Dr. Oscar Riddle, of the Carnegie Institution, Dr. L. B. Mendel, of Yale University, Dr. H. C. Sherman, of Columbia University, and Dr. T. N. Carver, of Harvard University.

The fourth session of the Graduate School of Home Economics will also be held during July at the college, under the auspices of the American Home Economics Association.

Additional information may be obtained from the registrar, A. M. Brown, of the Michigan College.

The National Education Association at St. Louis.—The winter meeting of the National Education Association at St. Louis, February 26–29, included the regular winter meeting of the Department of Superintendence, special meetings of the National Council of Education and the Department of Normal Schools, and regular sessions of six affiliated organizations, among which was the National Committee on Agricultural Education. The enrollment was the largest ever recorded at a winter meeting—about 1,900—and the program was full of interest to those concerned with vocational education.

The Department of Superintendence devoted one round-table session to agriculture in the rural school, at which several interesting papers were read, including The Educative Value of the Study of Agriculture, by Earl Barnes, of Philadelphia; To What Extent Can Agriculture be Taught Below the High School, by Hon. P. P. Claxton, U. S. Commissioner of Education; and The Next Step in Teaching Agriculture in the Rural Schools, by E. C. Bishop, of Iowa State College.

The National Committee on Agricultural Education held several sessions dealing with courses of study in agriculture. A joint session with the Department of Normal Schools afforded opportunity for a discussion of the place of the normal school in agricultural education. The National Society for the Study of Education held one session for the discussion of its annual yearbook, which as usual was published in two parts, the first devoted to industrial education, and the second to agricultural education in secondary schools.

This latter publication was prepared under the direction of D. J. Crosby, of this Office, and was by him discussed at the convention. It included the following papers: The Training of Teachers for Secondary Courses in Agriculture, by A. C. Monahan; The Vocational Agricultural School, by R. W. Stimson; State-Aided Departments of Agriculture in Public High Schools, by D. J. Crosby; High-School Agriculture Without State Subsidy, by W. H. French; Short Courses and Extension Work in Agriculture for High Schools—In the South, by H. F. Button, In the North, by F. R. Crane; In Public High Schools Should Agriculture be Taught as Agriculture or as Applied Science? by W. R. Hart; and In the Public High Schools Agriculture Should be Taught as Agriculture, Not as Applied Science, by G. F. Warren.

Conference for Education in the South.—The Fifteenth Conference for Education in the South was held in Nashville, Tenn., April 3–5, its purpose being the improvement of economic and civic conditions in the South through education.

In the Nashville meeting more than ever before was emphasized the improvement of rural conditions. Rural school work was extensively discussed by experts from several States, farm demonstration workers and the country church had a place on the program, and invitations were sent out to a thousand farmers and six hundred country ministers.

Round-table conferences were held during the two days preceding the regular conference, at which the subjects considered were rural school improvement, sanitation, rural high schools, and the work of the corn, tomato, and poultry clubs.

An afternoon conference was devoted to agriculture and agricultural education. Dr. John L. Coulter discussed Farmers' Cooperation; Bradford Knapp, director of farm demonstration work of this Department, The Demonstration Work and Some of its Results; and O. B. Martin, assistant in charge of demonstration club work of this Department, the Objects of the Boys' and Girls' Demonstration Work.

Among other topics discussed either at conferences or at meetings of affiliated societies were The Rural School as a Center of Country Life, The Rural Life Survey for Church and School, The Education of the Negro in the South, Health in Country Schools, and Rural Education a National Failure.

International Association of Poultry Instructors and Investigators.—Considerable progress is reported in extending the scope of this organization to include poultry instructors and investigators throughout the world. A provisional international committee has been formed with representatives in England, Scotland, Ireland, Australia, Tasmania, South Africa, India, Germany, Holland, Belgium, Denmark, Norway, and Italy. The representatives of the United States are J. E. Rice of Cornell University, L. J. Cole of the University of Wisconsin, and Dr. Raymond Pearl of the Maine Station, and those of Canada, W. R. Graham of Ontario Agricultural College and F. C. Elford formerly of MacDonald College.

Arrangements are being made for an initial meeting of this committee in London, July 18–24. Edward Brown, secretary of the National Poultry Organization of England, has been elected president, and Dr. Raymond Pearl, honorary secretary pro tem.

Reorganization of Agricultural Agencies in Peru.—A decree issued by President Leguia January 19 reorganizes the agricultural work carried on by the Ministry of Public Works, and establishes a central agronomic station at Santa Beatriz, near Lima.

This station is to be under the provisional charge of the director of the National Agricultural School, Senor Jorge Rorive, with 11 bureaus as follows: General agriculture, which will carry on experiments dealing with the introduction and acclimatization of plants; applied botany and vegetable physiology, which will study the national flora and plant diseases, and administer the seed distribution; agricultural microbiology, serum, and vaccination, to have charge of the National Institute for these purposes; agricultural physics and chemistry, chiefly for analytical work; zootechnics, to study the possibilities of livestock improvement by breeding and importation, and to have charge of the Zootechnic Experimental Station of Lima; applied technology, to foster industries derived from agriculture and stock raising; viticulture and enology, which will include the present work under way at Lima, Moquegua, and Ica; silviculture and arboriculture, which will include the work at Santa Beatriz with fruit trees and floriculture; rural engineering; and agricultural propaganda, which will administer the central station, the rice station at Lambayeque and the rubber station at Iquitos, and will have charge of all publications.

Agriculture in the Canton, China, Christian College.—For the past three years G. W. Groff has been working to inaugurate an agricultural department in connection with the Canton Christian College, his full support having been subscribed annually by the Christian Association of the Pennsylvania State College. He has studied the agricultural conditions and problems near Canton and in neighboring Provinces, has started an experimental garden and nursery in the college grounds, and has outlined a plan for the establishment of an agricultural department.

In his opinion, this department, while a part of the college and under the New York board of trustees, should be a separate school with an advisory board of directors outside of the college. It should offer a four-year course in agriculture for admission to which a secondary school certificate or its equivalent is required. The president of the college has approved this plan and has recommended to the board of trustees that an agricultural assistant be sent as soon as possible and that a directorate be formed in America as suggested, with an advisory board of Chinese and perhaps others in Canton to assist in its promotion.

County Farm Bureau in New York.—Jefferson County, New York, has appropriated $1,000 from county funds in a cooperative agreement with this Department, the State of New York, and the New York Central and Hudson River Railroad, under which a total of about $2,500 per annum will be available for establishing a county farm bureau. An agent will be appointed with an office at the county seat, who will be at the service of farmers of the county in the solution of farm management problems.

New Journals.—*Biochemical Bulletin* is being published quarterly by the Columbia University Biochemical Association, with Walter H. Eddy as editor-in-chief. Its purpose is announced as the promotion of biochemcal research and the extenson of biochemical knowledge.

The initial number contains, among other data, tributes to the late C. A. Herter and Mrs. Ellen H. Richards, a symposium on the chemistry of the cell, The Tannin-Colloid Complexes in the Fruit of the Persimmon, by F. E. Lloyd, The Relation of Biological Chemistry to Home Economics, by W. J. Gies, Suggestions to Teachers of Biological Chemistry, by J. Rosenbloom and W. J. Gies, and an account of the Proceedings of the Indianapolis Meeting of the Biological Section of the American Chemical Society, by C. L. Alsberg.

Bulletin d'Horticulture Méditerranéenne is being published from time to time under the editorship of Georges Poirault, director of the Villa Thuret and professor in the National School of Horticulture at Versailles. It is planned to give special prominence to matters pertaining to the maintenance of botanical gardens, parks, etc., the initial number consisting largely of an article by the editor as to the management of such gardens on the shores of the Mediterranean.

The Belgian Ministry of Agriculture and Public Works is publishing *Bulletin de l'Agriculture et de l'Horticulture.* Special prominence is given in the initial numbers to the crop reports and similar data from the various districts, as reported by the "agronomes," and to meteorological data.

Schlesische Monatschrift für Obst-, Garten-, und Gemüsebau is being published monthly as the organ of the Horticulturalists' Association of Silesia by the Provincial Chamber of Agriculture, and is devoted to a variety of horticultural topics.

The Cornell Veterinarian is being published semiannually under the auspices of the Alumni Association and Society of Comparative Medicine of the New York State Veterinary College of Cornell University. The number for January, 1912, is devoted especially to veterinary education.

La Vie Agricole et Rurale is a new farm weekly being published at Paris. The initial number has an article by P. Diffloth on the sale of agricultural products through associations.

La Riqueza Agricola is a monthly illustrated review of agriculture, zootechny, rural industries, and agricultural statistics in Peru.

Necrology.—Dr. Gustav Pusch, director of animal husbandry in the Kingdom of Saxony and professor of animal husbandry in the Veterinary High School in Dresden since 1888, died February 1.

For many years Dr. Pusch has been a successful writer, teacher, and popular lecturer on matters relating to live stock, and has also had a leading part in the practical work of improving live stock by better breeding and feeding. His most important writings are Die Beurteilungslehre des Rindes, and Lehrbuch der Allgemeinen Tierzucht.

A committee has been formed to solicit funds for the erection of a monument to the memory of A. Millardet, formerly professor of botany at the University of Bordeaux. Professor Millardet was the first to recognize the value of copper sulphate in combating the downy mildew and his investigations resulted in the formulation of Bordeaux mixture, one of the most efficient and widely used fungicides known. The treasurer of the committee is M. Andre Rozier, Gironde Agricultural Society, Bordeaux, France.

Miscellaneous.—The *Country Gentleman* of March 9 contains an illustrated account, by E. K. Parkinson, of the equipment and work of the Royal Academy for Agriculture and Brewing, including the experiment station, at Weihenstephan, in Bavaria, describing the various courses in land working or farm department. The academy has a staff of 30 teachers and the same number of assistants, and an attendance of 225 students.

It is announced that Prince v. Liechtenstein is establishing an institute for plant breeding at Eisgrub, in Moravia. The buildings are to be begun in a short time. Prof. Erich v. Tschermak, professor of plant breeding at the Agricultural High School at Vienna, will be director of the institute.

A tract of land in the Tenango Valley has been ceded by the State of Mexico to the Federal Government for the purpose of establishing an agricultural experiment station. There is a building on the land which was erected and used as an agricultural school during the centennial celebration.

L. H. Dennis, a graduate of the Pennsylvania State College and for ten years a teacher in the public schools of the State, has been appointed expert assistant in agricultural education in the state department of public instruction, to supervise the introduction of agriculture into the township high schools.

A. D. Hall, director of the Rothamsted Station since 1902, has resigned to devote his attention entirely to the work of the Development Commission, of which he has been agricultural representative since its inception two years ago. His resignation becomes effective in September.

Dr. J. C. Willis has resigned as director of the Royal Botanic Gardens, Peradeniya, Ceylon, to accept the directorship of the Botanic Gardens at Rio Janeiro.

Dr. William Trelease, director of the Missouri Botanical Garden since 1889, has resigned, and has been succeeded by Dr. George T. Moore, formerly of the Bureau of Plant Industry of this Department.

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EXPERIMENT STATION RECORD.

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The annual meeting of the Southern Commercial Congress recently held at Nashville, Tenn., was devoted to the presentation of facts showing the educational and agricultural recovery of the South during the past half century, and the discussion of measures for the further advancement of this great region along these lines. A considerable number of officers of this Department and of the agricultural colleges and experiment stations in the Southern States took part in this Congress. Conferences were held on soils, forage and horticultural plants, forestry, animal husbandry, drainage, roads, cooperative marketing, etc. Special interest was manifested in two conferences on extension teaching in agriculture, at which the attendance was relatively large and the discussion relatively broad.

The wide scope of extension work in agriculture already inaugurated in the South was illustrated and enforced at the opening of the first conference by President Soule of the Georgia College of Agriculture. He displayed an attractive series of charts showing how different agricultural problems and interests of Georgia were being taken up by the extension force of the college, partly in cooperation with this Department. The lines of work included farmers' institutes, movable schools, field demonstrations, special railroad trains, eradication of the cattle tick, boys' and girls' clubs, cooperation with the district agricultural high schools, etc.

The sympathy and support which extension work in agriculture is now receiving from educational leaders in the South were shown by the attendance and addresses of Chancellor Barrow of the University of Georgia, President Thach of the Alabama Polytechnic Institute, and President Hardy of the Mississippi Agricultural College. In order to come to this meeting, Director Dodson of the Louisiana Experiment Stations, and Professor Bryant of the Kentucky College of Agriculture, had left special railroad trains which were carrying agricultural information to multitudes of farmers in their respective States. Their interesting accounts of the success of these trains and the special means taken to make them effective

in spreading new knowledge among the rural people were received with much enthusiasm.

In these conferences, as well as in the general sessions of the congress, much attention was given to the great work of the farmers' cooperative demonstration system, inaugurated by the late Dr. Seaman A. Knapp and continued under the supervision of his son, Mr. Bradford Knapp. The latter presented at one of the conferences a carefully prepared paper in which the educational purpose of the work was clearly set forth, as well as the system of state and local agents and the methods of organizing and conducting the work among the farmers. The plans for carrying on this work in cooperation with state agencies were described by Mr. Knapp somewhat as follows:

There are now cooperative arrangements in force in every Southern State except two. Some of these are not as complete as desired, and not all have taken the form regarded as the very best, but every effort is being made to meet conditions as they are found.

In the State of Alabama the state legislature a year ago appropriated the sum of $25,000 annually, and created a State Board of Agriculture, consisting of the commissioner of agriculture as ex-officio chairman, the director of the state experiment station and the head of the school of agriculture in the Polytechnic Institute; and the Farmers' Cooperative Demonstration Work in Alabama is conducted in cooperation with this board.

In Arkansas a different form of cooperation is in existence. There the state legislature permits each county to appropriate money to assist the Federal Department in carrying on the demonstration work, and practically every county in the State has appropriated at least half the salary of the agents, the total sum thus subscribed being $40,000. This works very satisfactorily, and the relations with the agricultural college of the State are of such close and friendly character as to prove mutually advantageous.

But neither of these conditions approaches, in the final analysis, the system recently introduced in South Carolina, which is regarded as an important and significant step in advance. There the agricultural college and the Federal Department are directly cooperating in conducting the demonstration work in the State. A state agent has been appointed jointly by the two cooperating agencies, and district and local agents are appointed by a mutual understanding. One agent is located in each county, and the State is divided into three districts for the purpose of supervision under district agents. Each of these agents is not only the agent of the Farmers' Cooperative Demonstration Work, but is also the agent of Clemson College. Furthermore, the state agent is a member of the faculty of Clemson College, and as such is the head of the extension

work of the college and superintendent of the farmers' institutes of the State.

Thus under one head are coordinated the cooperative demonstration work of the Department of Agriculture and the demonstration and extension work of the college and the farmers' institute forces of the State. The organization is so logical and so full of possibilities that its ultimate success is thought to be assured. Under this system the local agent will not only conduct demonstration work but he will also have back of him the extension force of experts and the entire agricultural faculty at the institution, as well as that of the Department at Washington. The advantages of the system in promoting a wider influence, and in spreading information as to the short courses and other activities of the college, are believed to be manifold.

In a paper on the Organization and Administration of Extension Teaching in Agriculture, the Director of this Office summarized the present status of extension work in agriculture as conducted by the agricultural colleges and experiment stations, and emphasized the urgent need of the more systematic and thorough organization of this work under the supervision of the colleges.

Considered as an essential feature of the American system of agricultural education, it was held to be primarily the business of the State to create and maintain the institutions through which extension teaching in agriculture shall be conducted. Since it is an educational enterprise it will naturally be carried on by educational institutions rather than by administrative departments. The national and state departments of agriculture may very properly aid in this work, but the chief burden of responsibility for it in the several States will naturally fall on the agricultural colleges.

These institutions are now awakening to their responsibilities in this line. Already some form of organization for extension teaching in agriculture has been created in forty-three of our agricultural colleges. In all these institutions extension directors have been appointed. Eight of these are also directors of experiment stations, leaving thirty-five institutions with extension directors giving their time in whole or in part to this feature. In twenty-seven States there were in 1911 one hundred and nine men devoting all of their time to extension work. In twenty-nine States two hundred and fifty-six are reported as giving part of their time to extension teaching and to other forms of extension activity. In ten other States the members of the college and station staffs give part of their time to extension work, but the number so employed is not designated.

In twenty-eight States 160,073 persons were registered last year as regular students in extension classes, and in twenty-one States

1,230,940 are reported as "miscellaneous" or in irregular attendance. There was appropriated $397,573.42 by thirty-seven States for extension work in 1910–11, and $427,628.71 was expended by thirty-six States. For the college year 1911–12, $584,171 has been appropriated for thirty-seven States.

The uniting of this new department of instruction with the other work of the institution, so as to become an organic part of that work and representative of the instruction given by the college and of the researches by the experiment station, is most important and pressing.

The state colleges in which agriculture is taught are institutions broadly organized to give instruction in many subjects, and in twenty States the agricultural college is a part of the state university. It is now generally agreed that the agricultural work of the institution should be organized as a distinct unit, to which the name College of Agriculture is commonly given. Within this college are three main lines,—research, interior teaching, and extension work. It is well, therefore, that three administrative divisions should be made within the college to which the names Agricultural Experiment Station, Division of Instruction, and Extension Division may be respectively given. But it is also appropriate, and indeed essential, that the college as a whole should be divided according to the subject matter included within its curriculum into departments such as those of agronomy, animal husbandry, dairying, etc.

Since it is highly important that the information on any subject given to the students and public should represent the views of the institution as a whole, all the experimenters, teachers, and extension workers should be grouped by departments representing the specialties in which they are working. Thus the department of agronomy should embrace all the agronomists employed by the college, whether they are engaged in experimenting, teaching, or extension work. Each department will naturally be presided over by a chief, who will have authority to assemble all the workers in this line for consultation regarding the subject matter of their work, methods of instruction, etc. All the workers will be expected to keep in close touch with their respective departments, so as to be fully acquainted with their work and the progress of knowledge in these lines.

On the other hand, each member of a department will also be a member of a division, or in some cases of two or three divisions, and be expected to report to one or more division directors who will have authority to control the whole or parts of his time and assign him to duties as experimenter, teacher, or extension worker. This dual responsibility is already recognized in many institutions as regards the experiment station and the teaching, and needs only to be extended to cover the extension work. As far as possible it is very desirable

that the individual shall devote himself primarily and chiefly to one line of work, and as the extension work increases it will be necessary more and more to have men working exclusively in that department. This is already true with regard to the experiment station.

To carry out such an organization several classes of administrative officers will be required. The general management of the university or state college as a whole will naturally be vested in a president. Under him will be a number of deans, one of whom will have charge of the college of agriculture. Under this dean will be three directors—(1) of the experiment station, (2) teaching division, and (3) extension division. Each of these directors will have administrative control of his division. Where the work and staffs of the division overlap or cooperative action is desirable, the three directors should form a general administrative committee under the chairmanship of the dean. The control of the directors over the individual worker will chiefly have to do with the division of his time and his assignment to duties within the respective divisions.

The general program for the work of the college should be made up through the faculty, consisting of the dean, directors, heads of departments and other professors whose rank entitles them to be members of the faculty under the general policy of the institution. One feature of this program should be conferences of the workers in each department, under the chairmanship of the head of that department. Through such meetings and in other ways the extension workers should be brought into close touch with the work of the college and the experiment station. On the other hand, the teachers and experimenters may learn much from the extension workers regarding the real problems of the farmers and their families. Thus the teaching and experimenting of the college may be kept in line with the actual needs and conditions of the agriculture of the State.

The extension force in a well-equipped college of agriculture will include experts in a considerable number of lines, and a sufficient number of clerical assistants to keep the routine business running smoothly and efficiently. All this force should be under the supervision of the director of the extension division.

Plans for the extension work should be systematically made well in advance of their execution. Much will depend on the business ability and energy of the extension director. The selection of subjects, the preparation of charts, lantern slides, exhibits, circulars of information, advertisements, etc.; the making of arrangements with different local organizations, railroads and other cooperative agencies; the management of the force while in the field, and a variety of other necessary duties will call for much display of executive ability. There are so many lines of extension work in agriculture which under proper conditions may be profitably undertaken that it requires

nice discrimination on the part of the extension management to determine what it is best for a given institution to do with the limited funds at its disposal.

One of the greatest, and as yet largely unsolved, problems of extension work is the relation of the college force and organization to the local community. Thus far the extension work has not been done by the colleges on a sufficiently large scale to call for much elaboration of local organization, but the need for a broader organization is now growing more and more imperative.

Certain forms of extension work involve the cooperation of the rural schools. Some have thought that a plan might be worked out by which these schools would be made the public agencies for the local management of all extension enterprises. This would, however, involve considerable change in the general system of school management. The fact that most of the teachers in these schools are women, whose tenure of office is on the average relatively short, makes it very doubtful whether such a plan is feasible. If by a combination of school and extension work many more men could be brought into the service of the schools, and the rural teacher's career could be made more permanent and honorable, it would be to the great advantage of our rural communities. Wherever consolidated rural schools exist this plan might have a reasonable prospect of success.

Others have thought that county organizations might be formed under state laws, which would be charged with the local management of extension enterprises under the general direction of the agricultural college. It has been suggested that the fair associations be made the basis for these county organizations, and have their duties broadened to include the whole scheme of extension work.

Another plan calls for the establishment under public control of at least one demonstration farm in each county, the superintendent of which should be the local manager of extension enterprises under the control of the college. This might include the supervision of a considerable number of demonstration fields on farms within the county.

It seems most likely that we shall pass through a period of experimentation with different plans in different States, and that thus after a while some general American system for the local management of extension work in agriculture will be evolved. Whatever plan is adopted it should carefully conserve and help to broaden the spirit of initiative, self-help and cooperation among the country people. In establishing public agencies for the dissemination of agricultural knowledge on a broad scale there is much danger of leading the country people to lean too heavily on the national and state governments.

The extension movement may do more harm than good if the farmer is thereby made to believe that the government can make a set program for agricultural progress, and that he has only to follow the advice given in publications or by itinerant lecturers and teachers. It can not too often be said that research and instruction will never be able to establish and enforce definite rules for farming. American agriculture is now just passing out of its crude pioneer stage. It will become more and more a complicated and technical industry, in the prosecution of which broader and more exact knowledge, sounder judgment, and larger business ability will be required for success.

It is therefore essential that the extension system shall be developed out of its present stage, where it is largely a stimulative propaganda and a dissemination of information, and become truly educational, giving the farmer sound training and a broader intelligence, so that he will be able to take the new knowledge that comes to him from whatever source and apply it effectively in the conduct of his business and the life of his family and community.

42049°—No. 8—12——2

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The fermenting capacity of the average single cell of Bacterium lactis acidi, O. RAHN (*Michigan Sta. Tech. Bul. 10, pp. 3–40, fig. 1*).—By noting the number of bacteria with the usual plating method at the beginning and end of the experimental period it is possible to estimate the amount of acid formed by a single bacterial cell in 1 hour. The figure thus obtained will be sufficiently accurate to detect any variation in the fermenting power of the micro-organism.

The loop-actual-microscopic method of counting was found entirely unsatisfactory for such work, since many of the counts showed a decrease in the total number of micro-organisms after propagation. Actually counting the micro-organisms by the plate method is considered a better basis than ascertaining the weight of the bacteria and computing the fermenting capacity therefrom.

"The amount of acid formed by one cell in one hour was found to be in young milk cultures in the average of 57 determinations with various strains, 0.0.000,000,018 mg. or 18×10^{-10} mg. This is approximately the weight of one single cell. There is no experiment on record to prove that in the first stage of development the multiplication takes place without fermentation [as is asserted by several authors]. As soon as a determination of fermentation products is possible, it shows the fermentation per cell to be the faster the younger the culture. There is a distinct difference in the fermenting capacity of different strains. The weakest strain had an average fermenting capacity of 7.4×10^{-10}, while the strongest strain averaged 32.5×10^{-10} mg. per cell and hour.

"The fermenting capacity decreases with the age of the culture, and even if the acid is neutralized the fermenting capacity is lower though fermentation takes place again. Old cultures acidify slowly, even if transferred into fresh milk, the rate of multiplication is also influenced by long sojourn in the same culture. Peptone stimulates the acid formation of certain strains, but only by increasing their numbers while the amounts of acid per cell remain unaltered. Other strains show no material influence of peptone. In sugar-free broth they develop very slowly, but the fermenting capacity is normal if lactose is added. Temperature influences the fermenting capacity very decidedly."

The use of sodium paratungstate in the determination of carbon dioxid in carbonates and nitrogen pentoxid in nitrates by loss on ignition, F. A. GOOCH and S. B. KUZIRIAN (*Amer. Jour. Sci., 4. ser., 31 (1911), No. 186, pp. 497–500*).—"From the results of the experiments described . . . it is obvious that sodium paratungstate, easily prepared and stable, makes an excellent flux for use in the rapid determination of carbon dioxid and of nitrogen pentoxid by loss on ignition."

In regard to titrating phosphates, W. STRECKER and P. SCHIFFER (*Ztschr. Analyt. Chem., 50 (1911), No. 8, pp. 495–499*).—Comparative tests made between the uranyl acetate and silver nitrate methods show that both of them, when

used for pure alkali phosphates, yield results which compare well with the usual gravimetric method.

Preparation of neutral ammonium citrate solutions by the conductivity method, R. A. HALL (*Jour. Indus. and Engin. Chem., 3 (1911), No. 8, pp. 559–563, figs. 2*).—The results indicate that the conductivity method of preparing neutral solutions is applicable to the preparation of exactly neutral ammonium citrate solutions of such a density that they can, after neutralization, be diluted with distilled water and brought to a density of 1.09 at 20°, and this method is recommended for adoption as an Official Method for use in fertilizer analysis. A tub of water may be substituted for the regulated thermostat, but the latter is deemed preferable, as there is then no necessity of the measurements being carried out so quickly.

Quantitative determination of iron, ammonia, and nitrous acid in water with the Autenrieth-Koenigsberger colorimetric method, K SÜPFLE (*Arch. Hyg., 74 (1911), No. 4, pp. 176–184, figs. 6*).—A description of what is represented to be an extraordinarily practical, physically correct colorimetric apparatus, with the methods employed for determining the substances mentioned above in water.

The use of the ester method in metabolism studies, B. O. PRIBRAM (*Hoppe-Seyler's Ztschr. Physiol. Chem., 71 (1911), No. 5–6, pp. 472–478*).—In order to employ the esterification method in metabolism tests where a mixture of proteins and amino acids are concerned, the experiment must be accompanied by blank tests, otherwise the results obtained may lead to serious error. Glycocoll ester is easily saponified, and when this amino acid is not entirely esterified it can be easily missed if present in only small amounts. Proteins were also found to be entirely cleaved in a solution of absolute alcohol by hydrochloric acid. Partial cleavage is present after a short contact.

The separation and quantitative determination of small amounts of pyridin and ammonia, DELÉPINE and SORNET (*Abs. in Chem. Ztg., 35 (1911), No. 95, p. 872; Analyst, 36 (1911), No. 427, p. 508*).—Ammonia may be separated from pyridin by mercuric chlorid in the presence of sodium carbonate and sodium hydrate. The ammonia is removed from the precipitate obtained with sodium thiosulphate. The pyridin is distilled from the filtrate and weighed as a gold chlorid salt or platinate.

In regard to the quantitative determination of globulins by precipitation with ammonium sulphate and the purification of globulins, H. WIENER (*Hoppe-Seyler's Ztschr. Physiol. Chem., 74 (1911), No. 1, pp. 29–66*).—This is a study of methods, with particular reference to the globulins present in blood serum.

Determination of carbohydrates by oxidation with the aid of potassium permanganate in an alkaline solution, W. GREIFENHAGEN, J. KÖNIG and A. SCHOLL (*Biochem. Ztschr., 35 (1911), No. 3–4, pp. 169–193*).—Various carbohydrates, polyhydric alcohols and their aldehydes and ketones, as well as polysaccharids, can be decomposed quantitatively into oxalic acid and carbon dioxid with potassium permanganate and alkali. From the amount of oxygen utilized for the oxidation process it is also possible to calculate the amount of substance originally employed, providing the solution has been made acid after oxidizing and a standardized solution of potassium permanganate used for the titration. Formic acid could not be detected among the oxidation products.

The substances considered in this investigation were saccharose, lactose, maltose, glucose, fructose, galactose, raffinose, erythrit, glycol, glycerin, arabinose, xylose, rice starch, cassava starch, mannit, and dulcit.

The determination of lecithin, C. VIRCHOW (*Chem. Ztg., 35 (1911), No. 100, pp. 913, 914*).—A number of methods are described, including a modified one

which the author recommends for determining the lecithin content of medicinal preparations.

Chromophylls in the plant and animal world, M. S. TSVĚT (*Khromofilly v rastitel'nom i zhivotnom mirě. Warsaw, 1910, pp. 379, pls. 5; rev. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 5, pp. 766–768*).—Besides an exhaustive and critical survey of the literature, this monograph contains a new method for isolating chlorophyll in the original, unaltered form by adsorption.

Researches in regard to the presence of rice or darnel in wheat flour, E. COLLIN and PERRIER (*Ann. Falsif., 4 (1911), No. 36, pp. 493–503, figs. 2*).—A discussion in regard to the presence of rice and darnel (*Lolium temulentum*) in wheat flour, the characteristics of rice and darnel flour, and the method by which these foreign substances gain entrance into the wheat flour. A method is proposed for detecting these adulterations and impurities.

Researches in the value of potato varieties, P. BERTHAULT (*Sci. Amer. Sup., 72 (1911), No. 1878, p. 423*).—This article, which deals with the use of the microscope in selecting stock for different purposes, is based on the assumption that the cells which surround and hold the starch grains are an index as to the quality of the tuber. The author has therefore devised a method which he calls the cellular-density method.

The edible varieties show very small and numerous cells, while potatoes which are to be used for starch making, etc., are larger and less compact.

Invertase and diastase in honey, T. VON FELLENBERG (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 2 (1911), No. 6, pp. 369–377*).—Diastase and invertase were found to be present in honey. This point, however, has already been noted by Langer, Auzinger, and Moreau (E. S. R., 22, p. 512; 23, p. 307; 25, p. 412). Invertase was present in a greater quantity.

The author finds that precipitating the enzyms from honey with alcohol does not yield the total amount of enzym actually present. In order to obtain a figure which is not influenced by this error, the author recommends examining the enzyms in their natural substratum. The possibility of a hydrolysis of the dextrin of honey, which is, according to Barschall, a hexatriose, that is, a group of stereoisomers having trioses of varying rotations, must also be considered, as dextrin is not hydrolyzed by honey invertase. Honey diastase was found to exert its greatest activity upon potato starch, and a somewhat less one upon honey dextrin. The acids present in honey had very little influence upon the inverting process. Honeys which stand for a time lose some of their inverting capacity.

A polariscopic method for the determination of malic acid and its application in cane and maple products, P. A. YODER (*Jour. Indus. and Engin. Chem., 3 (1911), No. 8, pp. 563–574, figs. 2*).—A detailed description of a method previously noted (E. S. R., 24, p. 612).

Cocoa and chocolate: Their chemistry and manufacture, R. WHYMPER (*Philadelphia, 1912, pp. XI+327, pls. 13, figs. 19*).—This treatise, according to the preface, is designed to provide a standard work dealing with cacao from its growth until it is manufactured into cocoa and chocolate. Part 1 deals with the history, botany, and agriculture of cacao, part 2 with the manufacture of chocolate and cocoa powders, and part 3 with the general and analytical chemistry and microscopy of cacao products.

The arsenic content of shellac and the contamination of foods from this source, B. H. SMITH (*U. S. Dept. Agr., Bur. Chem. Circ. 91, pp. 4*).—Among other substances orpiment is generally added to shellac in India for giving the straw-yellow color characteristic of the higher grade of goods and at the same time to make the shellac opaque. As shellac is often used for coating the

inside of food containers, by confectioners for giving their candies a glossy appearance, and by brewers as a coating for fermentation and storage vats, 10 samples of shellac purchased at random in the open market were examined for arsenic.

All were found to contain amounts varying from 4 parts per million, calculated as arsenious oxid, to 2,080 parts per million.

Raffinose content of raw beet sugars, and the ratio of ash to the organic nonsugars, F. STROHMER (*Wchnshr. Cent. Ver. Rübenz. Indus. [Vienna], 49 (1911), No. 17, pp. 265, 266; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 10, pp. 638, 639*).—A low ratio of ash to organic nonsugars (below 1.5), according to this author, does not indicate the presence of raffinose. The ratios with 21 first product raw sugars from Hungarian refineries ranged from 1.02 to 1.86.

The quantitative analysis of human and of cows' milk, A. V. MEIGS and H. L. MARSH (*Med. Rec. [N. Y.], 80 (1911), No. 27, pp. 1309–1313*).—According to the authors "no analysis either of human or cows' milk has heretofore been made in which the various constituents were determined gravimetrically—each one isolated from a single sample and weighed separately and the separate weights when added together shown to be equal to the weight of the original sample." The authors have accordingly attempted to do this, and "by the methods described the following results were obtained: Cow's milk—water 88.279, fat 3.032, protein 2.942, lactose 4.482, extractives 0.603, ash 0.733; human milk—water 87,569, fat 3.087, protein 1.481, lactose 6.574, extractives 1, ash 0.252 per cent."

Capillary and adsorption phenomena observed with milk, A. KREIDL and E. LENK (*Pflüger's Arch. Physiol., 141 (1911), No. 10–12, pp. 541–558, figs. 3*).—By allowing a drop of cow's milk to fall upon a piece of bibulous paper 3 zones are produced, viz, casein, fat, and water. This is dependent upon a high ash content. Human, dog's, and cat's milk were not found to show a definite casein zone. Its nonoccurrence in human milk is probably due to its consistency and the fact that this milk has a low percentage of casein, while with dog's and cat's milk the spreading of the casein is hindered by the fats which they contain. As cow's milk when diluted to a certain point fails to give a definite casein zone, the method may be used as an index to the quantitative composition of milk, particularly with regard to fat and water.

Milk to which rennet has been added will when dropped on bibulous paper show a small casein zone, which after a time vanishes altogether. Coagulation by rennet is shown to go through a quicker cycle when observed by this method. The process seems to be much longer when the dark ground illumination method of observation is employed.

In regard to the practical control of the milk supply, H. M. HÖYBERG (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 12, pp. 392–396*).—The alcohol test will not always show whether a milk is abnormally acid, but when the milk is obtained from a few cows, colostrum and milk from animals having affections of the mammary gland can be detected with ease. Particular caution must be exercised in declaring a milk adulterated on the basis of the fat content, both in individual and mixed milk. A better criterion is the fat-free dry substance. Out of 1,000 milk samples none had a specific gravity below 1.0290, and only 2, that is 0.2 per cent, varied from 1.0290 to 1.0295, while 98.4 per cent of the milks showed gravities varying from 1.0310 to 1.0340.

The differentiation of raw from boiled milk, H. R. GÜNTHER (*Molk. Ztg. [Hildesheim], 25 (1911), No. 75, pp. 1423, 1424*).—After reviewing the various reactions thus far proposed for detecting boiled milk, the author discusses the limitations of the guaiac test. He also gives a method for so preparing the guaiac tincture for conducting the test that it will yield good results.

A simple method for distinguishing raw from boiled milk, O. VON SOBBE (*Molk. Ztg.* [*Hildesheim*], *25* (*1911*), *No. 85, pp. 1609, 1610*).—The acetic acid serum from milk which has been heated from 50 to 70° C., when boiled will yield a definite turbidity due to the coagulation of albumin, which later settles to the bottom of the test tube. Such a serum when heated to 78° C. will also yield a turbidity, but it can not be detected until the serum has been cooled. The author utilizes the above phenomenon as a basis for a reaction to distinguish raw from boiled milk.

The guaiac test for detecting heated milk, HINRICHSEN (*Ztschr. Fleisch u. Milchhyg.*, *22* (*1912*), *No. 4, pp. 114, 115*).—A discussion in regard to the value and limitations of this test.

The influence of preservatives upon the results of the guaiac test for detecting raw or boiled milk, B. KÜHN (*Ztschr. Fleisch u. Milchhyg.*, *22* (*1912*), *No. 4, pp. 115–124*).—When milk containing either bicarbonate of soda, boric acid, borax, or salicylic acid is tested with the guaiac test no reaction characteristic of boiled milk is obtained. Formalin gives a weakened guaiac reaction only when 20 cc. or over of 40 per cent formaldehyde per liter of milk is present. In boiled milk an addition of formaldehyde never gives the test for raw milk. Potassium bichromate when present in boiled milk will indicate raw milk with the guaiac test. Hydrogen peroxid when present in milk in the amount in which it is usually used as a preservative (1.5 to 3 cc. of 3 per cent hydrogen peroxid per 100 cc. of milk) suppresses the guaiac test if the milk has been exposed to hydrogen peroxid for from 15 to 24 hours. Hydrogen peroxid when present in milk is therefore liable to indicate boiled milk when the milk is actually raw. The reverse, however, is not the case.

The use of perhydrol as a mouth wash in testing milk for taste, V. BRUDNY (*Österr. Molk. Ztg.*, *17* (*1910*), *No. 21, pp. 287, 288; Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 89, pp. 1671, 1672*).—Perhydrol mouth wash is a stable 3 per cent solution of hydrogen peroxid. It is claimed that by washing out the mouth with this preparation before testing milk for taste, the taste sense becomes more acute, and at the same time it destroys pathogenic and other organisms which may be introduced into the mouth with the milk.

Tests with the "neu-sal" method, O. HOFFMEISTER (*Molk. Ztg.* [*Hildesheim*], *24* (*1910*), *No. 85, pp. 1601–1603*).—The results obtained with this method for the determination of fat in whole, butter, and skim milks show that the method is excellent for examining fresh, unpreserved whole and skim milks. For buttermilk it was without value. With the old form of apparatus (acid butyrometric) the method could not be applied for examining whole, butter, or skim milks to which preservatives had been added 24 hours previously.

Some of the difficulties in connection with the question of analytical standards for milk, butter, and butter fat in Egypt, A. LUCAS (*Cairo Sci. Jour.*, *5* (*1911*), *No. 63, pp. 297–317*).—This is a paper read before a meeting of the Cairo Scientific Society, November, 1911.

A high Reichert-Meissl value was characteristic of Egyptian buffalo milk fat, and was as a rule higher than that for Egyptian cow milk fat, which is different from the results obtained by Parodi. Despite this high value a minimum of 32 adopted by one analyst is considered too high. A minimum of 25.4 adopted by another is deemed too low, except possibly for the cow, goat, or sheep milk fat.

The Reichert-Meissl value for Egyptian butter fat is lowest during the summer when animals are fed on chopped straw, field peas, a few beans, or a little oil cake. It gradually increases as the food is changed to maize stalks and subsequently to clover as the year advances. Thus, the fat in butter is subject to seasonal variations. A low Reichert-Meissl value and a high Polenske

value is characteristic of Egyptian goat and sheep milk fat, and also of Syrian butter fat, which is principally from the sheep.

The paper was followed by a discussion by the other members of the society.

The judging of butter fat on the basis of the Ewers test, E. NOCKMANN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 12, pp. 754–757; abs. in Chem. Ztg., 35 (1911), No. 128, Repert., p. 535*).—A fat obtained from the milk of old lactating animals, which usually shows low Reichert-Meissl figures, was examined according to the Ewers method (E. S. R., 23, p. 417). This fat, if judged by the limits set up by Ewers, would point to an addition of 10 per cent palm fat. The same was found to be true when the cows were heavily fed on coconut cake or beets.

The quantitative determination of coconut fat in edible fats, W. ARNOLD (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 10, pp. 587–598; abs. in Chem. Ztg., 35 (1911), No. 128, Repert., p. 535*).—The saponification, Reichert-Meissl, and Polenske numbers are adequate guides for distinguishing coconut oil from other fats such as bovine and hog fats, oleomargarin, and compounded edible fats. The saponification and Polenske numbers for coconut oil on the one hand, and the figures for the remaining fats mentioned on the other, are so constant that the amount of coconut oil in a given sample can be calculated with ease. The relation of the Polenske number to the Reichert-Meissl figure will decide whether the fat contains appreciable amounts of butter fat. In margarin or other edible fats which contain other fats besides coconut oil, which are only detectable by means of a color reaction (sesame and cotton-seed oil), the coconut oil can be determined from the iodin figure or from its refraction. According to the author, the Hanus and Thian ethyl ester figure (E. S. R., 25, p. 108) can be dispensed with.

Detection of rape oil, P. TORTELLI and V. FORTINI (*Ann. Falsif., 4 (1911), No. 29, pp. 139–145; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, p. 678*).—Previously noted from another source (E. S. R., 24, p. 11).

A chemical investigation of American spearmint oil, E. K. NELSON (*U. S. Dept. Agr., Bur. Chem. Circ. 92, pp. 4*).—This circular reports the results of an examination of an authentic sample of Michigan spearmint oil, which was distilled from specially selected stock free from weeds. "The object of the investigation was twofold, first, to determine the chemical and physical constants on a pure sample of the oil, and second, to determine the nature of the constituent which carries the characteristic spearmint odor."

The author believes dihydrocarveol to be the substance which gives the characteristic spearmint odor. A careful search for dihydrocuminyl alcohol, which is considered by others to be the odoriferous principle, was made with negative results. A sample of dihydrocarveol prepared from carvone and then acetylated yielded a product which reminded one of spearmint.

Investigations in regard to betains occurring in plants, I, E. SCHULZE and U. PFENNINGER (*Hoppe-Seyler's Ztschr. Physiol. Chem., 71 (1911), No. 2, pp. 174–185*).—This work was done for the purpose of determining whether the phosphatids from plants when cleaved will yield betain in addition to cholin. Phosphatids were prepared from the seeds of *Vicia sativa*, containing betain, and *Pisum sativum*, *Phaseolus vulgaris*, and *Avena sativa*, which contained trigonellin. Oat (*Avena sativa*) phosphatid was the only one which yielded betain on decomposition.

Determination of fat in feeding stuffs, B. SCHULZE ET AL. (*Landw. Vers. Stat., 75 (1911), No. 3–4, pp. 185–230*).—This investigation was conducted for the purpose of determining the following points: (a) What influence the time of drying a sample before extraction has upon the final results; (b) how long

the ether extract should be dried after driving off the solvent; (c) the effect of pre-drying the sample and drying the ether extract for various lengths of time in the usual water-jacketed drying oven, or in a stream of illuminating gas. The feeds examined were peanut cake, cotton-seed cake, sunflower cake, sesame cake, hemp cake, coconut cake, linseed cake, palm cake, rape cake, rice feed meal, millet polish meal, and dried distillery slops. Ten examinations of each of the 12 feeding stuffs were made.

The results show that the substance must be so ground that the individual grains are 1 mm. in size. The extraction must be conducted with water-free ether. The material must be dried previous to extraction and the fat after evaporating off the solvent must be dried for a definite time. In the case of peanut cake, cotton-seed cake, sunflower cake, sesame cake, hemp cake, and rape-seed cake the ordinary drying oven is to be employed. The time of pre-drying of the feed and the fat extracted therefrom must be 2 hours in each case. Linseed cake and its fat ought to be dried in an oxygen-free gas for a period of 2 hours. If this method is not convenient, then dry for 1 hour in an ordinary drying oven. Coconut cake, palm cake, rice feed meal, millet polish meal, and distillery slops are to be dried in the usual water-jacketed drying oven for 1 hour, while the fat extracted from them is dried for 2 hours. In this instance compensation is made for residual water and volatile fat. The drying temperature should fluctuate between 98 and 100° C.

Determination of the purity of linseed cake, L. Vuaflart (*Ann. Falsif., 4 (1911), No. 33, pp. 381–388*).—This article considers the microscopic detection of the impurities, and the determination of cellulose and gum, in linseed cake.

In regard to the determination of rice spelts or hulls in rice feed meal, J. A. Ezendam (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1911, No. 9, pp. 77–89, pl. 1*).—As the result of his work the author finds that the chemical and microscopical methods when compared with one another yield nonconcordant results. The method with which he obtained the best results was as follows:

Fifty gm. of the rice feed meal was dried at from 100 to 105° C. and passed through a 0.5 mm. mesh sieve. The spelts remaining in the sieve are then finely ground and are mixed with the material which has passed through the sieve. Of the material thus prepared from 0.5 to 1 gm. (according to the amount of hulls present) is weighed off and boiled successively for 1/2 minute with 50 cc. of 10 per cent nitric acid and 50 cc. of 2.5 per cent sodium hydrate. After each operation the residue is washed with water on a cloth having 43 threads per centimeter (the meshes of the wet cloth are 100 μ); the substance remaining upon the cloth is placed in a porcelain dish and enough rubber solution is added to make a bulk of 12 gm. The mass is thoroughly mixed. The counting chamber is then filled evenly with the mixture and brought upon the object table of a preparation microscope (previously leveled with a spirit gage) and allowed to stand until the particles have settled to the bottom of the chamber. The rice spelts which appear in 3 rows 8 cm. long each in a field of 1.5 sq. mm. are then counted and reported with reference to 1 gm. of substance employed.

The normal figure found was 20. The results of tests with the method are given. See also the Katayama method (E. S. R., 24, p. 310).

Analyses of miscellaneous materials, A. J. Patten (*Michigan Sta. Spec. Bul. 55, pp. 3–12*).—Analyses are reported of alfalfa meal, barley bran, apple pomace, red kidney beans (refuse), beet-seed meal, brewers' grains, brewery mash, buckwheat bran, buckwheat flour, cotton-seed meal, gluten feed, linseed meal, middlings, pea bran, pea-vine hay, salvage wheat, salvage corn, and mixed feeds; alfalfa stems and leaves; nicotin in tobacco compounds; lime,

limestone, and marl; ashes (corncob and wood); paunch manure, barnyard manure, guano, fertilizer constituents in tobacco products, ground beans, peat filler, and garbage tankage; lime-sulphur solutions; and arsenate of lead and Paris green.

Quality in dry wines, R. JORDAN, JR. (*San Francisco, 1911, pp. 146, pls. 2, figs. 4*).—This is a discussion in regard to obtaining quality in dry wines through proper fermentation procedures. The various chapters of the book are as follows: The use of pure yeast and its action, settling or defecation of white musts as a basis of quality, aeration of the must before and during fermentation, the cooling of musts and control of fermentation, the artificial heating of musts, and fermentations in general.

On pulque and pulque drinking in Mexico, J. BLAND-SUTTON (*Lancet [London], 1912, I, No. 1, pp. 43–46, figs. 4*).—This is a concise description of the manufacture of pulque as practiced by the Mexicans. The history of its use as a beverage is also discussed.

Marking porcelain and silica crucibles, etc., P. A. YODER (*U. S. Dept. Agr., Bur. Chem. Circ. 93, pp. 3; abs. in Science, n. ser., 35 (1912), No. 897, p. 380*).—"Consecutive numbers in platinum or china colors may conveniently and neatly be put upon porcelain or silica crucibles, etc., by use of rubber [stamps]. To apply china colors, a sizing like 'fat oil,' is first stamped upon the crucible, the dry pigment then dusted on, and after the varnish has set, the excess brushed off and the crucible fired in a muffle at a red heat for an hour. Blacks, especially 'lettering black,' gave very satisfactory results and the numbers resisted treatment with hot nitric acid and alkali solutions."

METEOROLOGY—WATER.

International catalogue of scientific literature. F—Meteorology (*Internat. Cat. Sci. Lit., 9 (1912), pp. VIII+238*).—The literature indexed in this ninth annual issue of the international catalogue (E. S. R., 24, p. 517) "is mainly that of 1909, but includes those portions of the literature of 1901–1908 in regard to which the index slips were received by the central bureau too late for inclusion in the previous volumes. There are also entries dated 1910."

Division of meteorology, N. HELME (*Rhode Island Sta. Rpt. 1911, pp. 130–146*).—Daily observations at Kingston on temperature, precipitation, wind, and cloudiness for each month of the year ended June 30, 1911, are summarized in tables and notes. The mean annual temperature was 47.2° F.; the maximum, 92°, July 9, 1910; the minimum, —1°, December 16, 1910. The annual precipitation was 41.71 in., the number of clear days 153, and the prevailing direction of the wind west.

The climate of Ohio, F. CARNEY (*Bul. Sci. Labs. Denison Univ., 17 (1912), Art. 4, pp. 191–201*).—The characteristic climatic conditions and the Weather Bureau service of the State are briefly described.

The climate of the Continent of Africa, A. KNOX (*Cambridge, England, 1911, pp. XIV+552, maps 14; rev. in Nature [London], 88 (1912), No. 2201, pp. 305, 306*).—This book describes from personal observations as well as from the available meteorological records the climatic conditions prevailing in different parts of Africa, giving detailed records of temperature and rainfall and a number of rainfall maps. Different sections of the continent are treated separately, the natural products as well as the climatic conditions of each region being described.

How one billion of us can be fed, W J MCGEE (*World's Work, 23 (1912), No. 4, pp. 443–451, figs. 4*).—This is a discussion of the water supply of the United States as limiting food production and population.

It is estimated that the rainfall of the United States is barely 5,000,000 acre-feet, capable of maintaining a population not exceeding 1,000,000,000, which, at the present rate of increase, will be reached in three centuries. The author is of the opinion "that the time-honored standards for measuring capacity for production and population must change, and that the potential strength of countries must be expressed in terms of water supply rather than in terms of acres or square miles."

Sterilization of potable water by ozonized oxygen and chlorin compounds in a nascent state, E. ROUQUETTE (*Compt. Rend. Acad. Sci.* [*Paris*], *154* (*1912*), *No. 7, pp. 447–450*).—The author proposes a treatment of water with mixtures of (1) sodium bisulphate and hydrogen peroxid and (2) sodium sulphate and calcium hypochlorite, which he believes to be a practical method of rapidly sterilizing public water supplies and preventing epidemics due to water. Water so treated contains no objectionable substances or offensive taste or odor.

Irrigation with sewage, C. C. WILLIAMS (*Engin. Rec., 65* (*1912*), *No. 8, p. 224*).—This is a brief article in which it is maintained that "irrigation with sewage as ordinarily practiced is not the most economical method of treatment." The author states that so far as he is aware "there is not a city in the United States where the practice of disposal by broad irrigation can be called a success," and cites in support of this statement the experience at Pullman, Ill., Los Angeles and Pasadena, Cal., Colorado Springs and Greeley, Colo., and Salt Lake City, Utah.

Studies of sewage from the point of view of purification and utilization in agriculture, A. MÜNTZ and E. LAINÉ (*Monit. Sci., 5. ser., 2* (*1912*), *I, No. 842, pp. 95–111; Bul. Soc. Encour. Indus. Nat.* [*Paris*], *116* (*1911*), *No. 8, pp. 133–166; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 3* (*1912*), *No. 1, pp. 81–86*).—Summarizing investigations which have been previously noted (E. S. R., 25, p. 619), the authors call particular attention to the large losses of nitrogen (from 60 to 70 per cent) occurring in bacterial purification beds and the little or no loss occurring when sewage is spread on the land.

The average composition of Paris sewage is given as follows: Ammoniacal nitrogen, 21.61 gm. per cubic meter; organic nitrogen in solution, 7.66 gm., in suspension, 25.85 gm.; nitric nitrogen, 0.73 gm.; total nitrogen, 55.85 gm.; phosphoric acid, 12 gm.; potash, 45.65 gm.; lime, 377 gm.; magnesia, 104.4 gm. It is estimated that a cubic meter of this sewage is worth about 0.105 franc (about 2 cents) for fertilizing purposes, to which about 0.0025 franc should be added for irrigating value.

In experiments with this sewage on light soil, it was found that at the end of 7 months the subsoil had grown poorer in nitrogen but that the surface soil had been enriched in nitrogen by accumulation of organic matter which withstood the action of micro-organisms. The increase in phosphoric acid was also localized in the surface soil. Potash, lime, and magnesia were also partly retained in the surface soil and were partly carried into the lower depths, while still another part was removed in the drainage.

The best results with sewage as a fertilizer were obtained with grasses and forage plants. Sewage, however, is not considered a complete fertilizer and to yield the best results must be supplemented by other fertilizing materials. It is estimated that, when supplemented with phosphates, 800 cubic meters of sewage per hectare annually is sufficient for natural grasslands; from 500 to 600 cubic meters for wheat; and 1,400 cubic meters for a 3-year rotation. Since sewage water must be disposed of in winter as well as in summer, the area devoted to such disposal must be from 10 to 15 times in excess of what is needed for good fertilizing and irrigation.

The agricultural use of sewage water, A. MÜNTZ and E. LAINÉ (*Vie Agr. et Rurale, 1912, No. 10, pp. 241, 242*).—This is a summary account of investigations more fully reported in the article abstracted above.

Sewage sludge (*New York and London, 1912, pp. XI+272, figs. 42*).—This book contains translations of articles on Treatment and Utilization of Sludge, by A. Elsner (E. S. R., 25, p. 213); The Drying of Sludge, by F. Spillner (E. S. R., 26, p. 118); and Operation of Mechanical Sewage Plants, by Spillner and Blunk; as well as an article on Sludge Treatment in the United States, by K. Allen.

The last article summarizes what has been done by various cities and towns in the United States in the treatment and utilization of sludge. It is shown that up to the present time this subject has received little attention in America as compared with Germany or England, but it is believed that it is becoming increasingly important and will therefore command more attention. It is pointed out that European methods can not be applied in this country without modification on account of the highly dilute character of the average sewage in America. Numerous analyses are given of typical domestic and manufacturing city sewage, as well as of sludge obtained from various city sewage works. The method employed by the city of Baltimore in disposing of night soil on farms near the city is described, and the general subject of land application of sludge is briefly discussed. The general conclusion on this point is that the economical use of sludge as a fertilizer is exceptional and therefore the land disposal of this material is reduced to either drying or burying.

SOILS—FERTILIZERS.

The theory and practice of soil management, F. K. CAMERON (*Rpt. Mich. Acad. Sci., 13 (1911), pp. 55–63*).—The author discusses the different soil factors of crop production, stating that the practice of soil management "is rapidly becoming a highly developed art which needs for its best application a comprehensive coordination of the labors of the physicist, chemist, biologist, and other investigators, and a clearer understanding between the layman and the expert as to how they may be mutually helpful." See also a previous note (E. S. R., 26, p. 422).

Soil and soil problems from the standpoint of the physicist, J. A. JEFFERY (*Rpt. Mich. Acad. Sci., 13 (1911), pp. 36–39, fig. 1*).—As one of the factors of crop production on Michigan soils, attention is being given to the study of soil temperature. Some of the questions to be determined are the normal temperature of the different soil types, the variations of any individual of a type below normal, the practicability of raising the temperature toward or above normal by proper practice, and the effect of such rise in soil temperature on crop production.

Experiments at the Michigan Station "show that an application of 10 tons of manure per acre, worked to a depth of 6 in. into the soil when apparently no other influences are at work, results in a temperature rise of about 0.15° F. In sunshiny weather the temperature of the soil receiving this 10 tons of manure per acre is raised over 2°, apparently because of the increased capacity of the soil to absorb the sun's heat."

Soil and soil problems from the standpoint of the chemist, A. J. PATTEN (*Rpt. Mich. Acad. Sci., 13 (1911), pp. 40–45*).—In this discussion the author emphasizes the fact that investigations on the chemistry of the soil must take account not only of the inorganic plant food constituents but of the organic compounds as well. In his opinion none of the methods proposed for determining the availability of the inorganic plant food has a sound, scientific basis, but

"with a more complete knowledge of the composition of the organic matter of soils one will be able to predict more definitely in regard to the possible availability of some of the plant food elements in combination with it."

Soil and soil problems from the standpoint of the microbiologist, O. RAHN (*Rpt. Mich. Acad. Sci., 13 (1911), pp. 46–51*).—The important problems of soil bacteriology, in the author's opinion, are the determination of the humus forming organisms and their habits and food requirements, the constancy of the number of bacteria, bacterial action in soil and in solution, the influence of organic matter on bacterial development, and the relation of micro-organisms to the physical structure of soils.

Soil and soil problems from standpoint of botanist, W. H. BROWN (*Rpt. Mich. Acad. Sci., 13 (1911), pp. 52–54*).—In the author's opinion the important studies of the future, both from a scientific and a practical standpoint, are the form in which substances enter the plant, the relation of soil condition to plant physiology, the origin of toxic substances in the soil, and the oxidizing and reducing power of roots.

The influence of the soil type on the plant variety, J. L. BURGESS (*Bul. N. C. Dept. Agr., 33 (1912), No. 1, pp. 16*).—This paper shows the importance of a more careful study of the crop adaptations of the different soil types of the State and points out the value and wisdom of the work of mapping and analyzing the different soils.

Field operations of the Bureau of Soils, 1909 (eleventh report), M. WHITNEY ET AL. (*U. S. Dept. Agr., Field Operations of the Bureau of Soils, 1909, pp. 1756, pls. 25, figs. 58, maps 53*).—This report contains a general review of the field operations of the Bureau of Soils during 1909 by the chief of the Bureau, together with detailed accounts of the following surveys:

Orono area, Me., by O. Lee, jr.; Nashua area, N. H., by C. N. Mooney and W. C. Byers; Washington County, N. Y., by M. E. Carr, G. A. Crabb, V. J. Frost, and D. W. Hallock; Berks County, Penn., by W. J. Geib, E. L. Worthen, F. S. Welsh, J. C. Britton, and C. R. Zappone, jr.; reconnoissance survey of southwestern Pennsylvania, by H. J. Wilder and C. F. Shaw; Anne Arundel County, Md., by J. C. Britton and C. R. Zappone, jr.; Campbell County, Va., by R. A. Winston; Gaston County, N. C., by W. E. Hearn, L. L. Brinkley, and F. P. Drane; Lake Mattamuskeet area, N. C., by W. E. Hearn; Pitt County, N. C., by W. E. Hearn, R. B. Hardison, J. W. Nelson, and F. P. Drane; Scotland County, N. C., by R. B. Hardison, J. W. Nelson, and D. D. Long; Conway area, S. C., by W. J. Latimer and C. Van Duyne; Anderson, Franklin, and Saluda counties, S. C., by W. E. McLendon; Hancock County, Ga., by G. B. Maynadier and W. J. Geib; Pike County, Ga., by C. N. Mooney and G. B. Maynadier; Tift County, Ga., by J. C. Britton and P. O. Wood; Marianna area, Fla., by G. B. Jones, R. W. Rowe, J. C. Britton, R. B. Hardison, and C. R. Zappone, jr.; Chambers and Tallapoosa counties, Ala., by H. C. Smith and P. H. Avary; Hale County, Ala., by R. W. Rowe, W. G. Smith, and C. S. Waldrop; Baldwin County, Ala., by W. E. Tharp, H. Jennings, C. S. Waldrop, W. L. Lett, P. H. Avary, and L. Cantrell; Coffee County, Ala., by L. A. Hurst and A. D. Cameron; Clay County, Miss., by E. L. Worthen; Scranton area, Miss., by O. Lee, jr., R. T. Allen, and R. A. Winston; Lincoln Parish, La., by C. J. Mann and L. A. Kolbe; Grayson County, Texas, by F. Bennett, C. Lounsbury, R. T. A. Burke, A. T. Sweet, and P. O. Wood; Morris County, Texas, by E. B. Watson and R. T. Allen; Titus County, Texas, by T. D. Rice and E. B. Watson; reconnoissance survey of south Texas, by G. N. Coffey et al.; Auglaize County, Ohio, by W. J. Geib; Sumner County, Tenn., by C. N. Mooney, O. L. Ayrs, and J. L. Burgess; Spencer area, W. Va., by W. J. Latimer and F. N. Meeker; Waushara County, Wis., by J. W. Nelson, G. Conrey, and A. K. Kuhlman; re-

connoissance survey of Marinette County, Wis., by S. Weidman and P. O. Wood; Rice County, Minn., by R. T. A. Burke and L. A. Kolbe; Atchison County, Mo., by C. J. Mann and H. Krusekopf; Cedar County, Mo., by E. B. Watson and H. F. Williams; Cooper County, Mo., by A. T. Sweet, E. S. Vanatta, and B. W. Tillman; reconnoissance survey of western South Dakota, by G. N. Coffey et al.; Fallon area, Nev., by A. T. Strahorn and C. Van Duyne; reconnoissance survey of the eastern part of the Puget Sound basin, Wash., by A. W. Mangum et al.; Marshfield area, Oreg., by C. W. Mann and J. E. Ferguson; Woodland area, Cal., by C. W. Mann, J. F. Warner, H. L. Westover, and J. E. Ferguson; and Marysville area, Cal., by A. T. Strahorn, W. W. Mackie, H. L. Westover, L. C. Holmes, and C. Van Duyne.

During the calendar year 1909, 24,188 square miles, or 15,480,320 acres, were surveyed and mapped in detail on a scale of 1 in. to the mile, making the total area surveyed and mapped up to the end of that year 195,975 square miles, or 125,424,000 acres.

In addition to the detailed surveys, there were conducted in 1909 reconnoissance surveys in Pennsylvania, Texas, Wisconsin, South Dakota, and Washington covering a total area of 78,104 square miles, or 49,986,560 acres. Plans were formulated for taking up the same kind of work in the Ozark region of Missouri and Arkansas.

Analyses of Argentina soils (In *Esposizione Internazionale delle Industrie e del Lavoro di Torino, 1911, Catalogo Speciale Ufficiale dell' Esposizione della Republica Argentina. Buenos Aires, 1911, pp. 80–83*).—The results of mechanical and chemical analyses of cultivated and forest soils from different sections of the country are reported and briefly discussed.

Mechanical analyses of tropical soils, E. C. J. Mohr (*Bul. Dépt. Agr. Indes Néerland., 1911, No. 47, pp. 73, pls. 4, figs. 65*).—The author reports a comparative study of the physical composition, as determined by mechanical analyses, of soils derived from the different kinds of rocks of Java. The results in general confirmed the principle that rocks which contain the highest percentages of the weather resistant minerals form the lighter classes of soil.

The mechanical analysis of arid soils, W. Beam (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 4 (1911), B. Gen. Sci., pp. 34–45, figs. 3*).—This has been noted from another source (E. S. R., 25, p. 513).

Soils of the Gezira, W. Beam (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 4 (1911), B. Gen. Sci., pp. 45–59, figs. 4*).—Noted from another source (E. S. R., 25, p. 722).

Notes on some Catlin's River soils, B. C. Aston (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 6, pp. 478–482, figs. 2*).—Mechanical and chemical analyses of samples of soil from the region are reported and briefly discussed.

The results showed that the soils were well supplied with total nitrogen and contained large quantities of available potash and phosphoric acid, but were poor in lime and humus. All showed an acid reaction to litmus.

The distribution of bacteria in certain New York soils, H. J. Conn (*Abs. in Science, n. ser., 35 (1912), No. 893, pp. 226, 227*).—"Extensive work for 2 years with a certain clay loam at Ithaca has resulted in the isolation and study of about 500 cultures. These cultures have been classified into 34 types, which are essentially species. Grouping these types into 6 easily distinguished classes, their relative frequency can be thus stated:

"Five to 10 per cent spore-producing liquefiers, large rods (e. g., *Bacillus subtilis* and *B. mycoides*); 5 to 10 per cent nonspore-producing, rapid liquefiers, small rods with polar flagella (e. g., *Pseudomonas fluorescens*); 40 to 70 per cent nonspore-producing, slow liquefiers, short rods, immotile (except one with polar flagella), growing very poorly in ordinary laboratory media; about 10 per

cent nonspore-producing, nonliquefiers, short rods, immotile or with polar flagella; trace, Micrococci, like the last group physiologically; 15 to 45 per cent Actinomycetes.

"Of these 6 groups all are strict aerobes except a few in group 1; almost without exception none produce gas from sugars; while acid production, although common, is always very weak.

"Each group comprises about 7 or 8 types, except the last two, in which there are but 1 or 2 types."

In later investigations 40 more cultures were isolated from 4 different kinds of soil from other places in New York. "With few exceptions these cultures seem to be the same kinds as those previously studied, although the relative frequency of the types is different."

The need of the development of a technique to determine the relative abundance of different kinds of soil organisms is pointed out.

Regarding humus acids, B. TACKE, H. SÜCHTING, ET AL. (*Landw. Jahrb., 41 (1911), No. 5, pp. 717–754*).—The results of experiments to test the accuracy of the conclusion reached by A. Baumann and E. Gully from their investigations (E. S. R., 23, p. 715), namely, that there are no free humus acids, are reported in detail, and include studies on the amount of acids liberated by peat moss as compared with that liberated by starch, cellulose, and stearic acid from tricalcium phosphate (1.5 and 10 per cent solutions), sodium acetate, barium acetate, and calcium oxalate under varying temperatures; the absorption by peat moss, as compared with starch and gelatin, of alumina and iron from their respective chlorids, and of iron from ferric hydroxid; the electric conductivity of peat moss extracts as compared with that of different organic acids and of solutions of potassium chlorid; the acidity of leached and unleached plant substances; the blue coloration of a mixture of potassium iodid and iodate, and starch paste by different acids and acid-containing substances; the inversion of saccharose by humus extract; and the liberation of hydrogen from a mixture of iron and humus extract.

It was found that the amount of phosphoric acid liberated from the tricalcium phosphate by peat moss increased with the proportion of peat moss used, the amount of water remaining constant. With given amounts of peat moss more phosphoric acid was rendered soluble when larger amounts of tricalcium phosphate were used. Changes in the surface area of the soil colloids by drying produced no change in the solubility of the phosphoric acid. The colloidal character of the peat moss had no noticeable effect on the reaction with tricalcium phosphate. Starch as a neutral colloid did not render soluble any phosphoric acid from tricalcium phosphate.

Starch and cellulose, as neutral colloids, liberated no noteworthy amounts of acetic acid or mineral acid from the salts of the alkalis or alkaline earths. Peat moss, on the other hand, liberated considerable amounts of acetic acid from the acetates and small amounts of oxalic acid from calcium oxalate. No effect of the colloidal character of the peat moss was noticeable in the reactions of these salts.

Peat moss decomposed solutions of iron chlorid, decreasing the concentration to such an extent that nearly all the iron was precipitated from a 0.001-normal solution. Peat moss adsorbed the iron from a solution of colloidal ferric hydroxid, decreasing the concentration so that all the iron was adsorbed from a 0.01-normal solution. Heating greatly decreased the adsorption of iron from ferric hydroxid. Gelatin and starch adsorbed very small and, as compared with peat moss, substantially smaller amounts of iron from dilute solutions of ferric chlorid. Gelatin adsorbed very much smaller amounts of iron from ferric hydroxid solutions than peat moss and adsorbed no iron from a

0.5-normal solution but did adsorb water. The adsorption of iron by peat moss was accompanied by an evolution of hydrogen suggesting a possible chemical reaction. Neutralizing the soil acids with calcium carbonate checked the evolution of hydrogen almost completely. There was no definite relation between the extent of evolution of hydrogen and the adsorption of iron from ferric chlorid and colloidal ferric hydroxid. The colloidal character of the peat moss had no effect on the evolution of hydrogen.

The electrical conductivity was not a reliable indication of the absence of humus acids in the soil. It was found that other organic acids which are difficult to dissolve in water also showed a low electrical conductivity. Neutral colloids like starch did not give the blue coloration of a mixture of potassium salts of iodin, and starch paste. Only acids or acid containing substances, such as *Sphagnum acutifolium*, *Hylocomium schreberi*, *Cladonia rangiferina*, stems of *Trifolium hybridum*, stearic acids, humus acids, and peat moss, gave this reaction. Leaching the adsorbed bases of plants which contain colloidal substances did not affect the acidity. Peat moss inverted 96 per cent of saccharose invertible by hydrochloric acid.

The authors assert, on the basis of the foregoing investigations, that the position taken by Baumann and Gully is untenable.

Investigations on nitrogen transformation in different soils, H. Fischer et al. (*Landw. Jahrb., 41 (1911), No. 5, pp. 755–822*).—The investigations here reported consisted of a series of pot experiments with different soils to determine the rate of ammonification, nitrification, and denitrification in added ammonium sulphate, dried blood, and sodium nitrate, using, respectively, 2.9537 gm., 4.65 gm., and 3.7816 gm. per 2,837 gm. of soil with and without applications of lime, humus extract, and grape sugar. The soils used were a loamy sand and a light sand in one series of experiments, and a light loamy sand which had been used in a 3-year fertilizer test with sodium nitrate and ammonium sulphate.

There was a larger and more rapid nitrification of ammonium sulphate in the heavy soils than in the very light, sandy soils. Applications of lime increased nitrification—the heavy applications (1 per cent) more so than the light ones (0.3 per cent). The theoretical amount of lime (200 gm. of $CaCO_3$) required for the nitrification of ammonium sulphate (132.7 gm.) was not sufficient for complete nitrification, but about three and one-half times the theoretical amount was required. Ammonification of dried blood was more intense in light than in heavy soils. Ammonification did not check nitrification in the least but rather stimulated it in soils which nitrified ammonium sulphate only very slightly or not at all. In the heavier soils there was besides nitrification a noteworthy fixation of nitrogen; this was not noted in light soils. The application of dried blood stimulated nitrification irrespective of previous stimulation from applications of lime. There was a small but distinct variation in the bacterial activity of the soils taken from the unfertilized, the ammonium sulphate, and the sodium nitrate plats of the 3-year fertilizer test. Peat extract and grape sugar stimulated nitrification. In light sandy soils receiving applications of dried blood the loss of nitrogen by denitrification was greatest, being 7.29 per cent for a period of 11 weeks. In the heavy, loamy sands there was very little denitrification. The soils which nitrified poorly suffered the greatest loss of nitrogen. There was no denitrification with medium applications of sodium nitrate. Loss of nitrogen due to volatilization of ammonia occurred not only with applications of quicklime but with the unburned ground marl as well. The lime in the soil seemed to have much less effect in this respect than even very small amounts of added lime. Organic substances checked ammonifica-

tion and nitrification to a marked extent. Loss of nitrogen by volatilization of ammonia increased with the amount of sand in the soil.

A comparison of the results of pot experiments with those obtained by Remy's water-culture method showed that the bacterial characteristic of a soil was brought out more clearly and naturally in experiments with soils than with culture solutions, but even with soils the results were reliable only when frequent determinations were made of the different forms of nitrogen.

A bibliography of the literature on the subject is added.

Why do some soils nitrify organic nitrogenous substances and the ammonium salts of organic acids faster than they do ammonium sulphate or ammonium chlorid? J. C. TEMPLE (*Abs. in Science, n. scr., 35 (1912), No. 893, pp. 227, 228*).—"Of 26 Georgia soils tested for nitrification, 24 were found to nitrify tankage more readily than ammonium sulphate. In some cases the amount of nitrate recovered from tankage was 10 times that recovered when ammonium sulphate was the source of nitrogen. Tankage, cotton-seed meal, cowpea vines, gelatin, peptone, asparagin, urea, ammonium citrate, ammonium oxalate, ammonium tartrate, ammonium bicarbonate, and ammonium hydrate were nitrified faster than ammonium sulphate or chlorid. This condition was not due to the nature of the nitrifying organism in the soil, as the same thing held true when the nitrifying organisms were supplied as pure cultures, obtained from a number of sources. When calcium carbonate was added to the soil, ammonium sulphate was nitrified as well as any of the other substances.

"The explanation offered for this condition was that these soils (all of the Cecil group) were acid, and that the soil organisms decomposed the substances of organic origin in a way that more ammonia than acid was produced, thus correcting the acidity and bringing about a condition favorable for the growth of the nitrifying organisms. When ammonium sulphate or ammonium chlorid was added to the soil there was no chance for a similar decomposition and the soils remained acid."

The awakening of the soil, A. MÜNTZ and H. GAUDECHON (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 4, pp. 163–168, fig. 1; abs. in Rev. Sci. [Paris], 50 (1912), I, No. 5, p. 156*).—From a study of nitrification, which is considered the most pronounced and characteristic bacterial action of soils, the authors trace a relation of cause and effect which they designate as the awakening of the soil. That is, there is a maximum action and activity in the multiplication and function of micro-organisms in the soil at the time of the spring awakening between March 28 and April 25 in the climate of Paris. After a period of maximum intensity of nitrification there succeeds a pronounced slackening of activity which continues for a certain length of time, and if there is a further increase in nitrification it is never as great as at the period of maximum activity.

The gain in nitrogen during a five-year pot experiment with different legumes, B. L. HARTWELL and F. R. PEMBER (*Rhode Island Sta. Bul. 147, pp. 3–14, pls. 2*).—"This bulletin contains the details of a 5-year experiment in pots 12 in. in diameter, to ascertain the amount of nitrogen secured from the air, whether through the influence of nodule bacteria or of other micro-organisms, during the growth of legumes in a light gravelly soil, without the addition of nitrogenous manure but with optimum amounts of other manures.

"Vetch was grown in all the pots each winter in the greenhouse and was mixed with the soil at blossoming time. This was followed separately each summer by cowpea, soy bean, white-podded adzuki bean, and crimson clover. The summer legumes, exclusive of the roots, were usually removed from the soil and the nitrogen content determined. Preparatory to growing the vetch, the pots were usually transferred to the winter greenhouse."

The results with crimson clover and vetch were vitiated by injury by nematodes, which also injured adzuki beans to some extent but caused no damage to cowpeas and soy beans.

It was found that the approximate gain in nitrogen during 5 years with cowpeas and soy beans and with vetch, which was grown alternately with each, "was a ton of nitrogen per acre, about seven-tenths of which was contained in the 25 tons of moisture-free summer crops removed, and the remainder in the soil itself.

"These quantities should be considered with reference to the following facts, namely, the soil in the pots was 10 in. deep, somewhat deeper than the surface soil in many localities; the winter vetch was grown in a heated greenhouse; and, furthermore, sufficient water was given to supply all the needs of the plants."

Nitrates in soils, F. L. STEVENS (*Abs. in Science, n. ser., 35 (1912), No. 893, p. 227*).—Results of investigations are cited as throwing doubt upon the usual assumption that nitrates are the chief source of nitrogen for green plants, and the need of bacterially and chemically controlled tests under natural conditions to determine what forms of nitrogen are most readily available to the leading crop plants is pointed out. Nitrification and denitrification are discussed. "In particular, question was raised as to the influence of organic matter mixed with nitrates in fertilizers (a common practice) upon loss by denitrification. Stress was laid upon the need of conducting tests in soils, not in solutions."

Azotogen, nitragin, and natural soil inoculation, H. VON FEILITZEN (*Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 13–19, pp. 449–451*).—This is a reply to criticisms by A. Koch of the author's work on this subject.

A contribution to the knowledge regarding Loew's lime-magnesium ratio, R. STEWART (*Jour. Indus. and Engin. Chem., 3 (1911), No. 6, pp. 376–378; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 13, p. 821*).—An examination of the soil of one of the Utah Experiment Station farms showed from 30 to 41 per cent of calcium carbonate and from 11 to 20 per cent of magnesium carbonate to a depth of 8 ft. This soil has been cropped for 40 years without manure as far as the records show.

The results "show quite clearly that the high percentage of magnesia has no toxic action on the growth of the plants. It is evident that the magnesia does not have any toxic action on plant growth for one of two reasons: First, the ratio of magnesia to lime, which falls within the ratio (1:3), as recently suggested by Loew, is favorable to plant growth, or, secondly, the calcium and magnesium are present in the form of a double salt such as $CaMg(CO_3)_2$, and therefore magnesium carbonate, as such, exists in this soil only in small amounts. It seems possible that such a double salt would have a different action on plant growth than would either the magnesium carbonate or calcium carbonate alone," and this suggests the advantage of using magnesian limestone for correcting soil acidity.

Green manuring or bioculture, C. LUMIA (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 21 (1912), I, No. 2, pp. 140–145*).—The use and advantages of systems of soil improvement by means of leguminous green manures and mineral fertilizers, as first proposed by Ville and called by him sideration are discussed.

The influence of bacteria on the soluble phosphorus of manures, W. E. TOTTINGHAM (*Abs. in Science, n. ser., 35 (1912), No. 897, pp. 390, 391*).—An abstract of a paper presented at the Washington meeting of the American Chemical Society in 1911.

It is stated that in a "study of reactions between farm manure and reenforcing substances, such as feldspar, rock phosphate, and peat, investigation of fermenting manures has shown in all cases decrease of water-soluble phosphorus. Fermenting mixtures of manure and rock phosphate have shown greater decreases than manure alone. A typical experiment with mixed cow and horse manure fermented 6 months without and with rock phosphate (25 lbs. fresh manure and ½ lb. rock phosphate) involved 16.45 gm. soluble phosphorus in the manure and 18.49 gm. in the phosphate mixture at the start. The water-soluble phosphorus of the manure decreased from 86.7 per cent to 65.6 per cent of the total, a decrease of 24.3 per cent of the original water-soluble phosphorus. The sample with phosphate gave a decrease from 34.3 per cent to 14.7 per cent of the total phosphorus, a loss of 57 per cent of the water-soluble phosphorus. Common solvents for inorganic phosphates, such as carbonated water, ammonium citrate solution, and fifth-normal nitric acid recovered the depressed phosphorus only partially.

"Two and one-half months' standing with and without antiseptics produced the following changes of water-soluble phosphorus in manure-rock-phosphate mixture: Normal fermentation, decrease from 33.26 to 17.64 per cent of total; saturated with chloroform, decrease from 32.61 to 28.11 per cent; saturated with formaldehyde, decrease from 29.36 to 26.85 per cent. The losses amounted to 47, 13.8, and 8.5 per cent, respectively, of the water-soluble phosphorus. The results seemed to indicate that the losses observed were not due primarily to 'reversion' of inorganic phosphates, but chiefly to bacterial activity.

"Manure bacteria grown on media prepared from extract of fresh manure-rock-phosphate mixture reduced the soluble phosphorus of the media 23.8 to 63.6 per cent. Fresh intact bacterial cells of specific organisms and manure flora contained 34 to 53 per cent of their phosphorus in water-soluble form. Drying in vacuo at room temperatures did not alter the solubility of the phosphorus appreciably. The residual phosphorus was partly recovered from crushed cells by water and did not appear especially resistant to 0.2 per cent acid or alkali solvents. These results appear to point conclusively to bacteria as the chief cause of loss of soluble phosphorus in fermenting manures.

"Further work is in progress with acid phosphate and involving also the rôles of soil organisms and the plant in rendering phosphorus of manure bacteria available to crops."

The sprinkling of manure, M. RINGELMANN (*Jour. Agr. Prat., n. ser., 23 (1912), No. 6, pp. 179–182, figs. 4*).—Various methods and devices for sprinkling manure to prevent harmful fermentation are described.

Fertilizer chemistry: A report of progress, P. RUDNICK (*Abs. in Science, n. scr., 35 (1912), No. 898, pp. 425, 426*).—This is an abstract of a paper read at the Washington meeting of the American Chemical Society in 1911, in which some of the more important developments in the fertilizer industry are reviewed, including the increase in consumption of commercial fertilizers, advance in cost of materials supplying nitrogen, growth in the demand for nitrogenous materials of higher availability, the proposal to use raw rock phosphate in place of superphosphate, the effect of the German potash controversy in stimulating the search for new sources of commercial potash in the United States, and the need of a comprehensive and scientifically accurate theory of fertilizers.

The rational use of commercial fertilizers, A. M. SOULE (*Bul. Univ. Ga., 1911, No. 172, pp. 24, figs. 8*).—The general principles underlying the use of fertilizers are discussed with especial reference to their employment in a permanent system of agriculture adapted to Georgia conditions.

It is stated "that when used with any degree of skill, fertilizers are a profitable investment" for Georgia farmers, but it must be borne in mind in using

fertilizers "that a number of agencies are concerned in crop production, and that in order to secure the best results and develop a permanent system of agriculture all these factors must be taken into consideration."

Fertilizer economics, H. G. Bell (*Abs. in Science, n. ser., 35 (1912), No. 898, p. 427*).—This is an abstract of a paper presented at the Washington meeting of the American Chemical Society in 1911, dealing with the economic importance of the rational use of fertilizers.

The American fertilizer handbook, 1911 (*Philadelphia, 1911, pp. 296, figs. 18*).—In addition to the usual fertilizer manufacturers', cotton-seed oil mill, allied fertilizer trades, and foreign directories, this handbook contains the following special articles: The Florida Phosphate Deposits, by E. H. Sellards; The Three Essential Elements of Plant Food, by W. H. Bowker; Florida Phosphate Rock Shipments, 1909–10; Phosphate Rock Statistics; The Value of Commercial Fertilizers, by J. D. Toll; Sulphuric Acid Tables; Fertilizer Materials (annual review of the New York market); Chicago Ammoniate Market, by A. L. Sardy; Inorganic Nitrogenous Plant Foods, by F. J. Machalske; and Average Yields of Farm Crops.

Report of cooperative fertilizer and variety tests, 1911, O. H. Larsen (*Ber. Landbofor. Virks. Planteavl. Själland, 1911, pp. 336, figs. 13*).—The report contains accounts of the activities of the various agricultural societies of Zeeland during the year, especially cooperative variety and fertilizer tests. These covered 281 different trials with artificial fertilizers and lime for small grains, legumes, hay, and root crops, tests of the residual effects of artificial fertilizers, comparisons of different nitrogenous fertilizers (nitrate of soda, Norway nitrate, lime nitrogen, and ammonium sulphate), and experiments with lime, marl, and land plaster. The plant culture trials included 200 series of variety tests with small grains and root crops, and other experiments along similar lines as in previous years.

The importance of nitrate in the treatment of sewage and sludge, F. Guth and P. Keim (*Gsndhts. Ingen., 35 (1912), No. 4, pp. 57–62*).—This article reports a study of the effect of added nitrate on the decomposition of sewage, in which it was found that added nitrate acted like that produced in the ordinary course of mineralization of nitrogenous matter in controlling within certain limits the purification of the sewage, but that the nitrate remained inactive except in the presence of bacteria.

The effect of the "wet process" on the availability of low-grade nitrogenous materials, B. L. Hartwell and F. R. Pember (*Abs. in Science, n. ser., 35 (1912), No. 898, p. 426*).—In this abstract of a paper presented at the Washington meeting of the American Chemical Society in 1911 a brief account is given of pot experiments on two different soils, in which hair tankage, garbage tankage, and roasted leather were used both before and after having been subjected to digestion in the presence of phosphate rock and sulphuric acid (the "wet process"). The crops grown were Japanese millet (2 crops), oats (2 crops), and buckwheat (1 crop).

"The nitrogen of the garbage tankage had a very low availability both before and after acidulation; while that in roasted leather and hair tankage, although of low availability before, was much more available after, treatment.

"The treatment by the 'wet process' of these nitrogenous materials individually was conducted in the laboratory, but a mixture of the three was treated by the regular 'wet process' in a fertilizer factory. Over 70 per cent of the nitrogen in the 'base goods' so manufactured was soluble in water and highly available, but the insoluble nitrogen was of no immediate value."

The calcium carbid industry (*Abs. in Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 31, p. 569; Amer. Fert., 36 (1912), No. 3, pp. 42, 43*).—The *Lon-*

don Times is quoted as authority for the statement that calcium carbid is produced on a large scale in the United States, the industry being controlled by two companies, the most important of which is located at Niagara Falls. It is also stated that in 1910 the United States exported 25,933,670 lbs. of carbid valued at $733,574. The largest producer and exporter of this material for which statistics are available is Norway.

The use of calcium carbid for the preparation of calcium cyanamid for fertilizing purposes is said to be extending, but it is pointed out that cheap water power is essential for the most profitable production of the carbid and for the manufacture of the calcium cyanamid, and that the two processes should be carried on in close proximity.

The fertilizing value of the potassium silicate in phonolite, M. GELDMACHER (*Ztschr. Angew. Chem., 25 (1912), No. 7, pp. 292, 293*).—The author is of the opinion that the potassium silicate in phonolite has considerable fertilizing value, but believes that further investigation on this point is necessary.

A chemical solution of feldspar (*Sci. Amer., 105 (1911), No. 7, p. 136; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 8–10, p. 1996*).—It is stated that by heating finely ground feldspar with calcium chlorid, which can be obtained as a cheap by-product of soda making, and some limestone, the potash can be extracted as the soluble chlorid, the residue being suitable for calcination for use as cement. One ton of feldspar can be made to yield by this process 190 lbs. of potassium chlorid worth $4.50, and 5 or 6 bbls. of cement worth as much more.

Potash salts from seaweed, G. V. GREEN and H. S. JOHNSON (*Chem. Engin., 15 (1912), No. 2, pp. 55–60*).—A study of the chemical composition and distillation products of samples of Atlantic sea grass and of *Nereocystis leutkeana* collected at two different dates during the winter of 1910–11 on the Pacific coast is reported.

On the basis of the average composition of the whole Pacific seaweed it is estimated that a ton of dry material will yield about 600 lbs. of potassium chlorid of 80 per cent purity, worth $12, and 2 lbs. of iodin worth $4. This is a much lower value than that estimated by Balch,[a] who concluded that a ton of thoroughly air-dried kelp should be worth about $25, but included in this a certain value for volatile and nonvolatile distillation products. The author, however, found the distillation products from the 3 kinds of weed examined by him to be worthless.

Further investigation of the subject on a large scale is considered necessary before drawing conclusions as to the probable commercial success of the treatment of Pacific seaweeds.

Effect of ignition on solubility of soil phosphates, G. S. FRAPS (*Jour. Indus. and Engin. Chem., 3 (1911), No. 5, p. 335*).—The effect of igniting mineral phosphates, such as may occur in the soil, for 10 minutes at a low red heat was studied, and it was found that this treatment increased about 10 times the solubility of the phosphoric acid of wavellite, dufrenite, and variscite in fifth-normal nitric acid and rendered these phosphates almost completely soluble in 12 per cent hydrochloric acid.

The author concludes that "ignition of the soil will probably render inorganic phosphates soluble in acid, and therefore is not a method for estimating organic phosphoric acid. Ignition of the soil renders considerable quantities of iron and aluminum oxids soluble in acid."

The sulphur requirements of crops in relation to the soil and air supply, E. B. HART (*Abs. in Science, n. ser., 35 (1912), No. 898, p. 427*).—This is an

[a] Jour. Indus. and Engin. Chem., 1 (1909), No. 12, p. 777.

abstract of a paper presented at the Washington meeting of the American Chemical Society in 1911, covering substantially the same ground as articles previously noted (E. S. R., 25, p. 519).

The fertilizing action of manganese, A. and P. ANDOUARD (*Engrais, 26 (1911), No. 33, pp. 915, 916; abs. in Chem. Abs., 6 (1912), No. 3, p. 403*).—In experiments in which manganese carbonate was used at the rate of 300 kg. per hectare (267 lbs. per acre) in combination with a complete fertilizer, it was found that the yields of wheat and kidney beans were increased but that the yields of carrots and potatoes were decreased.

Wool fertilizer, suints, and sheep guanos (*Sta. Agron. Aisne Bul., 1911, pp. 70–74*).—Analyses of samples of material composed of mixtures of suint, wool fibers, sheep manure, and other materials are reported, showing nitrogen varying from 1.5 to 4.3 per cent; phosphoric acid from 0.18 to 0.82 per cent; and potash from 0.06 to 0.67 per cent. The article emphasizes and explains the very variable character of such materials, and maintains that they are valuable primarily as sources of nitrogen and not of phosphoric acid and potash.

Soot: Its character and composition, J. B. COHEN and A. G. RUSTON (*Jour. Soc. Chem. Indus., 30 (1911), No. 23, pp. 1360–1364*).—Analyses of soot from various sources are reported. These show that boiler soot from the base of the chimney contained little or no nitrogen and was practically flue dust having very little fertilizing value. The nitrogen content, however, increased with the height in the chimney (to 2.32 per cent in one example reported). Soot in flues from ordinary fireplaces burning coal was found to be comparatively rich in nitrogen (from 2.33 to 6.89 per cent), but in this case also the nitrogen content increased with the height in the chimney. The point especially emphasized is the very great variability in composition and fertilizing value of soot. "As a general rule, the lighter, the more springy and the bulkier the soot, the higher its nitrogen content, and the greater its value as a fertilizer will be."

Estimates are given of the amount of soot in the air of Leeds and the immediate surrounding country, and the harmful effect of air so contaminated upon plant growth is discussed.

Inspection of commercial fertilizers, H. D. HASKINS ET AL. (*Massachusetts Sta. Bul. 140, pp. 86*).—"This bulletin gives a detailed report of the fertilizer inspection for 1911. It gives the full text of the new fertilizer law recently enacted, states the number of fertilizers inspected, gives trade values of fertilizer ingredients, provides a summary showing average composition of unmixed fertilizing material as well as pound cost of each element of plant food furnished. Special attention is called to commercial shortages existing in both unmixed fertilizing materials and mixed goods. Particular emphasis is laid upon the economy of purchasing only high-grade fertilizers. A summary table shows the general standing of each manufacturer's brands. A discussion is made of the quality of plant food found present in the mixed goods, particularly with reference to the activity of the organic nitrogen. Tables of analyses give the detailed composition of all fertilizers sold in the State."

Inspection and analyses of commercial fertilizers on sale in the State, W. F. HAND ET AL. (*Mississippi Sta. Circ. 33, pp. 53; Bul. 150, pp. 51*).—Analyses and valuations of fertilizers inspected during the season of 1910–11 are reported and discussed.

Tabulated analyses of commercial fertilizers, W. FREAR (*Penn. Dept. Agr. Bul. 212, 1911, pp. 111*).—This bulletin gives the results of fertilizer inspection, including analyses and valuations, in Pennsylvania from January 1 to August 1, 1911.

Inspection and analyses of cotton-seed meal on sale in Mississippi, W. F. HAND ET AL. (*Mississippi Sta. Buls. 148, pp. 35; 151, pp. 29*).—These bulletins give the results of analyses and valuations of samples of cotton-seed meal inspected during the season of 1910–11.

Fertilizer trade in Spain, R. FRAZER, Jr., and E. J. NORTON (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 48, pp. 840, 841*).—It is stated that the use of fertilizers, especially potash fertilizers, is rapidly increasing in Spain, the imports of fertilizing materials through the port of Valencia having a value of $5,000,000 in 1909 to $6,000,000 in 1910. No fertilizing materials are imported directly from the United States.

Referring to the efforts to exploit calafatite (alunite) deposits near Almeria, it is reported that the ore was found to be of low grade (2 per cent) and the deposits of little or no commercial importance.

AGRICULTURAL BOTANY.

An elementary inquiry as to the origin of species, R. H. FIRTH (*Jour. Roy. Army Med. Corps, 16 (1911), No. 5, pp. 497–504*).—The author places on record the results of several years' observations on a number of strains of Epilobium. Some of them vary quite decidedly from the parent species, *E. hirsutum*, and reproduce by seeds true to the strain.

The author also records observations on a number of pedigreed strains of Œnothera and Epilobium to test the effect of environment, nutrition, and external disturbing agencies on their development. The plants were watered with solutions containing various mineral constituents. In one instance aberrant forms were observed. This was in the case of *E. parviflorum* watered with potassium nitrate. The plant produced in this aberrant form did not conform to any variety of the type, and it had been perpetuated through the second generation.

Other experiments were conducted in which injections of various solutions were made into the ovaries containing unfertilized ovules, but in most cases the ovules were killed. In plants of *E. roseum* injected with a solution of common salt and ammonium carbonate a number of aberrant forms quite unlike the common type were obtained.

The author draws the conclusion from his observations that new species may result not only by hybridization but by mutations, the majority of cases being probably through hybridization.

The root habits of desert plants, W. A. CANNON (*Carnegie Inst. Washington Pub. 131, 1911, pp. 96, pls. 23, figs. 17*).—A study has been made on the influence of environment, including moisture in the soil and temperature of the soil, on root development, the observations being made on Tumamoc Hill, the flood plain of the Santa Cruz River, and on the sloping mesa or bajada near Tucson, Ariz.

It was found that the roots of most annuals do not penetrate the soil deeper than 20 cm. The largest development of lateral roots from annuals takes place from 4 to 5 cm. from the surface of the ground. The root systems of summer annuals, which are distinct from winter annuals, are especially well developed, and this characteristic is due to the great luxuriance of roots of the summer forms, owing to the favorable vegetative conditions of the season.

Perennial plants were found to have 3 types of roots, the generalized type, with the tap root and laterals well developed, and 2 specialized forms, one of which has a prominent tap root, and the other prominent laterals. The most shallow rooted perennials observed were *Opuntia arbuscula* and *Echinocactus wislizeni*, the roots of which are frequently not more than 2 cm. below the surface.

Most cacti are found to have two divisions of the root system, an anchoring and an absorbing system. In some cases fleshiness is developed, and in the roots of opuntias this is a condition resulting directly from an abundant supply of water. A similar phenomenon was observed in *Brodiæa capitata*.

Perennials with the generalized type of root system were found to have the widest local distribution, while those with a pronounced development of the tap root are limited in their distribution.

The anatomy and some biological aspects of the ball moss, Willie I. Birge (*Bul. Univ. Texas, Sci. Scr. No. 20, 1911, pp. 24, pls. 10*).—A study was made of the ball moss (*Tillandsia recurvata*) to determine some of its biological aspects.

From the anatomical as well as the morphological structure of the plant it is claimed that it is epiphytic rather than parasitic. The holdfasts do not penetrate beyond the dead cortex of the bark, and there is a lack of organs for the absorption and conduction of food, making it impossible for the plant to get its nourishment through the roots, which merely attach it to its substratum.

An inquiry was made regarding the effect of this plant on the trees bearing it, the common belief being that it often destroys trees by too much shading. It appears that possibly some buds are smothered by the dense growth of the moss on the young branches. Experiments in spraying with a 10 per cent solution of kerosene were conducted, with the result that all the younger plants were killed by the spraying. A somewhat stronger solution should be used for the older plants.

Investigations on the respiration of plants, W. Zaleski and A. Reinhard (*Biochem Ztschr., 35 (1911), No. 3–4, pp. 228–245; abs. in. Jour. Chem. Soc. [London], 100 (1911), No. 589, II, p. 1021*).—Seeds, seedlings, and etiolated leaves of peas, lupines, wheat, beans, and cucurbits, leaves of a begonia, and buds of *Populus* sp. were ground in a mortar and the effect of the destruction of their cells on respiration was determined.

In some cases the respiration, as measured by the carbon dioxid output when compared with that of living material, was increased after grinding, while in others it was diminished. When sugar solutions fermented with zymin were added to cultures containing pulverized wheat and pea seedlings, or where yeast extract was employed, respiration was considerably accelerated. Quinin had no effect on the respiration of pulverized or germinating pea seed.

The influence of the partial suppression of the reserve material in seed on the development of the plant, Delassus (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 26, pp. 1494–1497*).—Experiments are reported on beans, vetches, and lupines in which portions of the reserve material were removed. The seeds were soaked in water for 24 hours, and from seed of different lots one-half of a cotyledon, an entire cotyledon, and one and one-half cotyledons were removed, after which the seeds were planted in open soil. The germination, growth, number and size of leaves, fresh and dry weight of plants, and period of flowering and fruiting of the different lots were noted.

In general it was found that the injury retarded the development of the plants through the different stages of growth, and that the influence was almost in direct proportion to the extent of the mutilation. An interesting observation was also made, that the weaker vetch plants which were grown from mutilated seeds were much more injured by fungus attack than were the plants from uninjured seed.

On protein formation in ripening seeds, E. Schulze (*Hoppe-Seyler's Ztschr. Physiol. Chem., 71 (1911), No. 1, pp. 31–48*).—This is a continuation of work done by the author in connection with E. Winterstein (E. S. R., 24, p. 531) and

contains, besides a brief notice of other contributions, a summary of the progress made by him to date, in substance as follows:

Without expecting to arrive at an immediate explanation of the progress of protein synthesis in plants, the investigator aimed at the collection of more observation material upon which possibly to base a theory of such process. In the first communication on this subject attention was called to the fact that for answering the question as to which nitrogen compounds serve chiefly in ripening seed as material for protein synthesis, the conclusions reached by investigations of such seed are in themselves of no great importance. It is reasonably certain that for this rapidly advancing process many nitrogen compounds move rapidly from elsewhere in the plant, while others move slowly or not at all, so that the rest of such compounds which are found in unripe seeds along with the protein may vary widely from the mass of nitrogen compounds which go to these seeds out of other parts of the plant. This mass was investigated, and it is claimed that information was gained not only on the seed hulls as receptacles for reserve materials, but also on leaves and stems as such receptacles in the case of young legumes. It appears that of these, asparagin is present in quantities greater than that of any other nonproteid nitrogen compound. The unripe seeds contain amids in very small amounts only. Seeds of *Phaseolus vulgaris* tested for asparagin gave negative results. This is in keeping with the view that in the ripening seeds asparagin is employed in protein building. This amid probably finds like employment in the young leaves.

Doubtless in the case of the legumes the mixture of nonproteid nitrogen compounds that travel toward the ripening seeds have a great similarity with that which goes to the young leaves of the rest of the plant. This points to the conclusion that in the ripening seed the protein synthesis goes on much as in the young leaves, but the manner of this process is unknown at present.

In unripe legume seeds there are found along with proteins small quantities of asparagin, monoamino acids, arginin, histidin, etc. This is easily explainable, for it may be accepted that the building of protein out of nitrogenous material from the hulls as well as from leaves and stems requires a certain time, and is complete only with the full ripening of the seeds. If unripe seeds were examined at any stage there would be found along with proteins other nitrogen compounds. By comparing these with the mass of nonproteid nitrogen compounds going to the seeds, it was found that only in unripe seed hulls, not in the unripe seeds, was tryptophan to be found. This is comprehensible on the view that the tryptophan is transferred from the hulls into the ripening seeds, there to be employed in protein synthesis, and in consequence is not present in appreciable quantities.

On the other hand, it was found that the unripe seeds contain some glutamin, while this amid was not yet to be found in the seed hulls nor in the leaves and stems. This may be explainable on the supposition that minute quantities of glutamin, along with asparagin, migrate toward the ripening seeds to the end of protein synthesis, and that being more slowly changed than asparagin the glutamin accumulates there in sufficient quantities to respond to test. That one can in like manner account for the great difference as regards arginin content which shows itself between the unripe seeds and the rest of the plant must be considered questionable. It seems that one must here also think of a synthetic manufacture of arginin in the ripening seeds.

The author claims that the question left open by A. Emmerling as to which particular materials migrate to the ripening seed from the rest of the plant may be partially answered, since in the case of the legumes not only out of the reserve-holding seed hulls but also out of the leaves and stems a number of

nonproteid compounds have been isolated. Along with these are doubtless others not yet identified.

The influence of oxygen upon the alcoholic fermentation in peas, L. IWANOFF (*Ber. Deut. Bot. Gesell., 29 (1911), No. 9, pp. 622–629*).—This is a study of the behavior of oxygen in connection with the evolution of carbon dioxid in the case of peas, both living and when dried and pulverized, and under conditions of its aerobic and anaerobic separation.

It was found that not only in air but also in a vacuum after exposure to air for a time the amount of carbon dioxid was increased. Such increase also followed the reduction of the dried peas to powder in air, a result ascribed to expansion of the absorbing surface. Evolution of carbon dioxid under anaerobic conditions after exposure to air was ascribed to the oxidation of incompletely oxidized products of the anaerobic destruction of the fermenting body.

The nutrition of green plants with formaldehyde and formaldehyde-yielding substances, T. BOKORNY (*Biochem. Ztschr., 36 (1911), No. 3–4, pp. 83–97; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 589, II, pp. 1021, 1022*).—The author shows in experiments with spirogyra, cress, celery, parsley, and other plants that free formaldehyde in too concentrated solution is injurious to plants. When sufficiently diluted, and especially in water cultures to which monopotassium phosphate, calcium nitrate, and magnesium sulphate were added, spirogyra was able to synthesize starch.

The effect of some formaldehyde-yielding substances was investigated, and with methylal starch formation took place in algæ only when placed in the light. Algæ were found able to synthesize starch from a sodium bisulphite compound of formaldehyde, the light again playing an important rôle.

The results with flowering plants were less conclusive. Methyl alcohol in 0.5 to 1 per cent solution was found to stimulate the germination and growth of peas.

On the influence of camphor, thymol, and menthol upon growing hyacinths and tulips, F. KRYŽ (*Ztschr. Pflanzenkrank., 21 (1911), No. 4, pp. 199–207, figs. 2*).—In view of the well-known stimulating effect exerted by the vapors of ether and other anesthetics upon certain plants the author instituted experiments to ascertain the effect of camphor, thymol, and menthol fumes upon hyacinths and tulips in the stage of rapid development when just ready to flower. The first series related to the influence of the vapors on the plants through the parts above ground. The second tested the effects of the fumes acting upon the underground parts.

In the first series the plants kept for 10 hours daily under bell jars filled with the vapors showed generally at first some acceleration of growth with slight yellowing, soon followed by lowering of turgor and wilting, with increasing transpiration associated with apparent loosening of structure. This showed earliest and most markedly in the upper younger parts of the leaves and unopened flowers, their growth being quickly checked and remaining backward or stationary. The tulips appeared to be the most easily influenced by the vapors.

In the second series the finely comminuted volatile bodies were intimately mixed with the soil in which the plants were set. Little change was noticeable at first, but after 10 or 12 days a progressive wilting set in and growth was retarded or stopped. The roots appeared abnormal and the plants seemed to be deficient in acids. Menthol gave the greatest retarding effect upon growth, but all showed the injurious effect of the unfavorable medium after the first brief period of slight stimulation had passed.

FIELD CROPS.

The experimental error of field trials, W. B. Mercer and A. D. Hall (*Jour. Agr. Sci., 4 (1911), No. 2, pp. 107–132, figs. 10*).—The authors discuss two methods of reducing experimental error, (1) by repetition over a number of years, and (2) by multiplying a number of plats on a given field. Tables state the relative location and yields secured from 200 plats of mangels and 500 plats of wheat. In connection with the mangels, tables state the varying weight of rows of plats, the relation between the weights of roots and leaves, and the standard deviation with different numbers of competent units. In connection with the wheat yields, tables state the relation between grain and straw, varying weight of rows, influence of position on land, and the standard deviation in one-fifth acre plats composed of different numbers of units.

In view of the data presented the authors draw the following general conclusions:

"In all field trials, however uniform the land and careful the management of the experiment, there will be an experimental error attached to the result, due to so many incalculable factors that it may be described as casual. The error diminishes with the size of the plat, but the reduction is small when the plat grows above one-fortieth of an acre. The error may be best diminished by increasing the number of plats similarly treated and scattering them about the area under experiment, but there is not much to be gained by increasing the number of plats above five.

"For practical purposes the authors recommend that in any field experiment each unit of comparison (variety, method of manuring, etc., according to the subject of the experiment) should be given 5 plats of one-fortieth of an acre each, systematically distributed within the experimental area." On land at all suitable, this will reduce the experimental error to within 2 per cent of the result, but will not eliminate the unequal effects of different seasons upon the varieties or the action of fertilizers.

An appendix by "Student" outlines a plan whereby "the experimental error may be still further reduced when only a single comparison is desired, as for example between 2 varieties or 2 methods of manuring, by taking advantage of the correlation which exists between adjacent areas."

Field trials and their interpretation, A. D. Hall and E. J. Russell (*Jour. Bd. Agr. [London], Sup. 7, 1911, Nov., pp. 5–14, figs. 2*).—The authors discuss the probability, causes, and magnitude of the experimental error in field trials. They arrange the sources of variation in two groups, (1) those which decrease as the size of the plat decreases, such as soil variation and conditions of growth, and (2) those which increase as the size of the plat decreases, such as individual variations and the incidence of disease.

Differences are least in the first group when plats are narrow and lie side by side. On the Broadbalk field at Rothamsted such plats similarly treated differ by from 5 to 7 per cent as compared with differences of from 7 to 12 per cent in the case of plats placed end to end.

A table states the probable error for simple and scattered unit plats of various sizes. In the case of simple one-fiftieth acre plats, for instance, the probable error is 4.2 per cent as compared with 2.4 per cent when made up of 5 scattered units. One-fifth acre plats made up of 5 scattered one-twenty-fifth acre plats have a probable error of 1.3 per cent as compared with 1.1 per cent when made up of 10 one-fiftieth acre plats, 1.7 per cent when made up of 2 one-tenth acre plats, and 3.1 per cent as simple plats.

The interpretation of experimental results, T. B. Wood (*Jour. Bd. Agr. [London], Sup. 7, 1911, Nov., pp. 15–37, figs. 2*).—These pages contain the sub-

stance of an earlier contribution by the author in collaboration with A. B. Bruce and F. J. M. Stratton, previously noted (E. S. R., 24, p. 633). A table of odds has been added and its use is explained.

Methods of farming in older settled districts (*Ann. Rpt. Dept. Agr. Saskatchewan, 6 (1910), pp. 85–90*).—The author summarizes the answers received from the older settled districts of Saskatchewan to inquiries sent out to determine the average size of farms and changes in agriculture, resulting principally from the fact that the soil has been under cultivation for a considerable period.

Of those replying, 22 per cent farm a section, 23 per cent three-fourths of a section, and 33 per cent half a section of land. Seventy per cent state that they secure as good wheat yields as when they began farming in this province. Twelve per cent report increased yields, while 15 per cent report decreased yields which some attribute to variable seasons. Practically all state that better cultivation is now necessary in order to maintain the high yields. Ninety per cent state that the land is now easier to plow, but 40 per cent complain of the soil "blowing." Packing is reported to have obviated this difficulty in a number of cases. Weeds have caused changes in farming methods in 58 per cent of the cases, but the use of crop rotation is still in the experimental stage and no definite percentage of farmers reporting it is stated. One third are experimenting in the growing of grasses and alfalfa, while 67 per cent have done nothing in the way of growing leguminous crops.

Variety tests during 1910, O. Lemmermann and P. Liebau (*Landw. Jahrb., 41 (1911), No. 3–4, pp. 389–415*).—These pages present in tabular form the results of tests of varieties of winter rye, winter wheat, winter barley, spring wheat, oats, sugar and other beets, red clover, alfalfa, and corn. In connection with most of the crops the date and rate of sowing, date of harvesting, the method of fertilization, and the crop which occupied the land during the preceding year are stated.

These tests were conducted on the experiment fields of the Royal Agricultural High School at Dahlem. Earlier variety tests by the same authors have already been noted (E. S. R., 24, pp. 731, 732).

[Experiments with field crops], F. Watts et al. (*Rpts. Bot. Sta. [etc.] Antigua, 1910–11, pp. 8–31*).—Meteorological data are followed by notes on the cotton industry and numerous lines of experimental work taken up by the station during 1910–11. Tables state in full results obtained in tests of cassava varieties during 4 and 6 year periods, and of sweet potato, yam, cotton, eddoe, tania, and broom corn varieties during briefer periods. Notes are also given on an experiment for the control of the root disease of corn.

[Corn, sugar cane, rice, and cotton experiments], F. A. Stockdale (*Rpt. Bot. Gard. Brit. Guiana, 1910–11, pp. 11–14*).—These pages give brief progress reports of work with corn and sugar cane and of hybridization experiments with rice and cotton.

Winter cereal report for 1910: State farm, Rome, Bungeworgorai (*Queensland Agr. Jour., 26 (1911), Nos. 2, pp. 58–62; 3, pp. 111–118*).—This article reports the results of variety and fertilizer tests, hybridization work, and miscellaneous sowings of cereals.

Influence of low temperature and of the snow covering on the wintering of cereals, A. Stebut (*Viestnīk Russ. Selsk. Khoz., 1910, Nos. 38, 39; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 1, pp. 134, 135*).—After a comparative study of the yields and meteorological data for a series of years, the author concludes that cold winters are followed by wheat yields somewhat below the average and rye yields somewhat higher

than the average. Rye yields below the average and wheat yields above followed warm winters.

An abundance of snow was followed by somewhat lower yields of rye and considerably lower yields of wheat than the average. Every winter with little snow the contrary was the case for both rye and wheat.

Severe cold and lack of snow during the first half of the winter did not cause winterkilling, but the coldest March weather (1905) was followed by the lowest wheat yield. The 8-year average wheat yields on sheltered fields was less than two-thirds as great as the 6-year average on open fields.

Laying down land to grass on the Clifton Park system, J. HUNTER (*Irish Farming World, 24 (1911), Nos. 1242, p. 1265; p. 1243, pp. 1288, 1289; 25 (1912), Nos. 1244, p. 13; 1245, p. 36; 1246, p. 57; 1247, pp. 82, 83*).—This is an address given before the agricultural society of the University of Wales. The author presents data which he regards as demonstrating that roots are the cheapest, deepest, and best tillers, drainers, and warmers of the soil, and that the cheapest manure for soil is a turf composed largely of deep rooting plants.

Experiments on permanent grass land, 1911 (*Agr. Students' Gaz., n. ser., 15 (1911), No. 4, pp. 113–117*).—In a test of 19 different amounts and mixtures of natural and artificial fertilizers, the greatest hay yield followed an application of kainit and ammonium sulphate. Notes state the results of a botanical examination of the growth following these applications.

Establishing a breed of alfalfa for the irrigated lands of Colorado, W. H. OLIN (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 284–287*).—The author outlines the methods followed in the origination and establishment of a new breed of alfalfa based upon a single plant selected from among several thousand.

Among the important criteria in the selection of plants for further use were the percentage of leaf to stem, the character of stem and root growth, and the stooling power of the unit plants. The green weight of the leaves from the plants studied varied from 14½ to 90 oz. per plant, while the weight of air-dried leaves ranged from 5⅜ to 28 oz., and the percentage of leaf to stem from 23 to 58. A strain designated as No. 19, which was preserved as especially promising, had leaves from ⅜ to ⅝ in. wide, and from 1 to 1⅜ in. long as compared with a normal width ranging from ⅛ to ⅜ in. and a length from ⅝ to 1⅛ in.

During this work a difference in vitality of alfalfa plants was observed, to which the author attached importance. In seeking the cause of this difference T. K. Blinn, who subsequently continued the work, observed a similar difference in the plants in alfalfa nurseries throughout the country, and as a result of his observations was enabled to divide all alfalfa plants into 2 classes on the basis of root growth. "All plants, seed for which came from warm climates, have a pronounced tap root, with but few if any side or lateral roots; all plants from northern or cooler climates have a dominant tap root but carry pronounced and important side or lateral roots. For this reason if any accident occurs to this tap root, cutting or rotting it off, there remains enough strength in the lateral roots to enable the plant to reestablish itself. In case of the southern type the plant dies."

Growing alfalfa, M. NELSON (*Arkansas Sta. Circ. 14, pp. 4*).—Directions for growing and curing alfalfa in Arkansas are given.

The personal equation in breeding experiments involving certain characters of maize, R. PEARL (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 21 (1911), No. 6, pp. 339–366, figs. 5*).—These pages state the results of classifications of the kernels from 4 ears of corn by 15 competent, and, with one exception, specially trained observers. The observers worked independently and classified the

kernels of each ear into yellow starchy, yellow sweet, white starchy, and white sweet groups. The 4 ears used were selected at random from about 2 bu. of ears bearing F_2 kernels, and secured by crossing a white sweet with a yellow dent variety. Both varieties used were pure in the sense that each bred true to the general type to which it belonged.

Tables state the names of the observers, the classifications of kernels made by each, the range of variation shown by the classification, the mean deviation from the mean (total and net), and the total deviations of the counts of all observers. The original and second counts of certain observers are also stated.

In view of the data presented the author concludes that no two observers agreed in the observed F_2 Mendelian ratios because their classification of kernels disagreed by reason of (1) somatically intermediate kernels, and (2) the personal bias or idiosyncracy of the observer. These differences were so great as to demonstrate "that the personal equation is a factor which can not safely be neglected in work of this character." The personal equation was smallest in the case of the observers most experienced in the observation of variation in connection with the particular class of material here observed.

No evidence appeared of the difference between the progeny of somatically intermediate kernels and that of distinctly nonintermediate kernels of the same gametic constitution.

Corn culture, J. M. KIMBROUGH (*Georgia Sta. Bul. 97, pp. 93–107*).—Earlier results of these or similar experiments have already been noted (E. S. R., 22, p. 633; 25, p. 232).

In a test of 17 corn varieties for which seed was donated by the growers, the yields ranged from 15.07 to 26.15 bu. per acre. Vallenweider Blend, Harley Improved, and Whatley Improved yielded over 25 bu. per acre.

In the nitrogen test in which "3 formulas were made to carry precisely the same amounts of phosphoric acid, potash, and nitrogen" the 3 years' average yield secured from the cotton-seed meal formula was 28.94 bu. of shelled corn per acre as compared with 31.57 bu. with nitrate of soda, 31.92 bu. with sulphate of ammonia, and 25.38 bu. on the check plat. "The cotton-seed meal formula made less corn than nitrate of soda and sulphate of ammonia formulas every year during the test." The experiment has been conducted on a different part of the farm each year.

In another experiment the 3 years' average yield secured after the use of the cotton-seed meal formula was 33.96 bu. of shelled corn per acre as compared with 35.25 bu. after a tankage formula and 35.52 bu. after a half tankage and half cotton-seed meal formula. From these 2 experiments the author feels warranted in concluding that "there is a great loss by the southern farmers using cotton-seed meal as a source of nitrogen."

Detasseled corn produced an average yield of 68.04 bu. of shelled corn as compared with 67.25 bu. when detasseling was not practiced. The 2 years' average yields of seed from the butts, middles, and tips were 25.7, 22.85, and 25.97 bu. of shelled corn per acre, respectively. The average yield for 2 years' planting of 2 stalks per hill was 55.04 bu. per acre as compared with 42.45 bu. from only 1 stalk. The hills were 3½ ft. apart in each direction and all plats were fertilized with 300 lbs. of 16 per cent acid phosphate, 60 lbs. nitrate of soda, and 60 lbs. of muriate of potash per acre. The 3 years' average yield secured by the Williamson method was 32.62 bu. per acre as compared with 34.18 bu. secured by the ordinary method. The methods followed are described in detail.

Cotton culture, J. M. KIMBROUGH (*Georgia Sta. Bul. 98, pp. 107–122, fig. 1*).—The earlier results of these or similar experiments have already been noted (E. S. R., 22, p. 635; 25, p. 233).

In 1910 the yields of seed cotton per acre secured in a test of 33 varieties ranged from 1,489 lbs. to 2,256 lbs. and averaged 1,894 lbs. In 1911, 28 varieties were tested and the highest yielding variety as in 1910 was McElhenny Cleveland. A table states the yields given by each of the 33 varieties at their first, second, and third pickings, in order to indicate their relative earliness.

In the 3 years' nitrogen test an average yield of 1,320 lbs. of seed cotton per acre was obtained from the cotton-seed meal plat, as compared with 1,367 lbs. from the nitrate of soda, 1,416 lbs. from the sulphate of ammonia, and 940 lbs. from the check plats. In an oat, pea, cotton rotation a 3 years' average of 1,634.39 lbs. per acre of seed cotton was secured from the cotton-seed meal plats, as compared with 1,682.78 lbs. from the tankage, 1,648.67 lbs. from the half tankage and half cotton-seed meal, and 1,364.32 lbs. from the check plats. The use of muriate of potash was followed by a 3 years' average yield of 1,589 lbs., as compared with 1,609 lbs. after the use of kainit. Rust developed during only 1 year of the experiments and from this year's experience the author advises the use of kainit on land which is subject to rust, but prefers the use of muriate on other land because of the higher cost of kainit as a potash source.

After 3 years' work the author feels warranted in stating that he believes a variety of cotton immune to anthracnose can be produced. On the plats devoted to this work he obtained a plant which had 66 matured bolls besides blooms and squares, and yielded seed cotton at the rate of 1 lb. for each 45 bolls.

Culture of Sea Island cotton in Cuba, H. P. STARRETT (*Daily Cons. and Trade Rpts.* [*U. S.*], *15* (*1912*), *No. 40, p. 717*).—No trouble was experienced with the boll weevil during 3 years' tests conducted to determine whether or not such trouble would result from planting cotton in Cuba during September. Sea Island cotton seed from Florida was planted the first year and all trash was burned immediately after harvesting during each of the 3 years.

Studies in Indian cotton, H. M. LEAKE (*Jour. Genetics, 1* (*1911*), *No. 3, pp. 205–272, pls. 2, figs. 6*).—After a discussion of the genus Gossypium and the monopodial and sympodial types used in this investigation, the author states the results of experiments dealing with the color of the corolla, the red coloring matter of the sap, the leaf factor, the type of branching, the length of the vegetative period, and the leaf glands. A discussion of the correlations observed and a bibliography of 23 titles are followed by 29 tables which present the correlation and other numerical data obtained.

Report on the manurial trials on cotton carried out on the state domains, 1910, F. HUGHES and H. C. JEFFERYS (*Agr. Jour. Egypt, 1* (*1911*), *No. 1, pp. 8–16*).—Physical and chemical analyses of the soils of the experiment fields accompany tables stating the results of fertilizer and ginning tests of cottons.

Chinese cotton production, G. E. ANDERSON (*Daily Cons. and Trade Rpts.* [*U. S.*], *15* (*1912*), *No. 42, p. 752*).—Statistical data on the acreage of cotton grown in China and the amount imported and exported in recent years are followed by the statement that "with cotton supplanting opium on many Chinese farms, reduced imports and increased exports of cotton may be expected."

Yield of potatoes under different methods of cultivation, K. K. VASIL'EV (*Selsk. Khoz. 1910, No. 41; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *12* (*1911*), *No. 3, pp. 425, 426*).—At the Uman Agricultural School the Early Rose potato was used in cultural tests during a number of years.

The 3 years' average yields secured by planting 14 in. apart each way were practically equal to those secured by planting 17½ in. apart each way during a 5-year period, and somewhat greater than those secured by planting 21½ in. apart each way during 6 years or 28 in. during 4 years. In wet years planting 21 in. apart each way was followed by the higher yields while in dry years 14 in. apart each way appeared the best distance.

In the rather wet year 1908 potatoes planted 21 in. apart each way on ridges gave lower yields than those planted in furrows, but the usual method of planting gave considerably better results than the use of either furrows or ridges. In the dry year 1909, however, the best yields were obtained by planting on ridges.

The use of small tubers with an average weight of 19 gm. each resulted in a smaller growth of foliage than when medium sized tubers averaging 43 gm. in weight were used, but the yield of tubers was about the same in each case.

Depth of planting appeared to make little difference, as the yields following planting to depths of 1¾ and 5¼ in. were almost equal. The 4-year average yield secured from planting the transverse halves was somewhat greater than the 3-year average secured by the use of the longitudinal halves, and both were excelled by the 4-year average resulting from the use of whole tubers. In dry years the yield from the halves was considerably lower than that secured by the use of whole tubers, but in wet years the reverse was the case. In the dry year 1909 the making of hills proved injurious, but in the wet year 1908 it appeared advantageous.

[Cultural tests with rye at the Zmiyev experiment field], M. F. Kramarevski (*Yuzh. Ross. Selsk. Khoz. Ghaz., 1908, Nos. 17, 20; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 3, pp. 407, 408*).—These pages report the results of tests of different rates of sowing rye, and different depths and times of plowing. Early sowing and deep plowing gave higher yields of grain and straw on April fallow than on black fallow.

The grain yields increased with the depth of plowing in the case of wheat, barley, and millet, but the shallow plowing gave larger oat yields. Early sowing of millet gave larger yields.

Other things being equal, the different fallows ranked in the following order so far as yields were concerned: With deep plowing—April fallow, black fallow, May fallow, a fallow with vetches, and the June fallow; with shallow plowing—black fallow, April fallow, May fallow, June fallow, and a fallow with vetches.

Methods for the improvement of sorghum, A. H. Leidigh (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 294, 295*).—This is a very brief review of work done by a number of investigators on the improvement of sorghum. The author suggests the use of bagging as especially valuable in this connection, and cites a strain of Orange sorghum grown 2 years from seed bagged each year as possessing extraordinary vigor, purity, and uniformity.

Sugar beet: Some facts and some illusions, J. W. Robertson-Scott (*London, 1911, pp. XIX+424, pls. 72, figs. 37*).—Information on the status of the sugar-beet industry is followed by chapters on the botany, agriculture, manufacturing processes, and economic and political problems connected with sugar-beet production and the beet-sugar industry.

The absorption and utilization of the principal plant foods by the sugar beet, A. Dushechkin (*Vĕstnik Sakh. Promuish., 1910, pp. 714–732, 791–797, 828–835; 1911, pp. 40–46, 74–78, 130–133, 162–173, 203–212, 241–249, 274–282, 306–312, 334–343; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 3, pp. 385, 386*).—These pages report the results obtained on unfertilized and phosphate fertilized plats on the Trostyanetsk estate in Bogodukhov County in the Kharkov government. During the investigation examinations were made every 10 days after the appearance of the beet sprouts. Observations were made of the weights of leaves and roots and the ash, nitrogen, phosphoric acid, potash, and sugar contents of the roots.

Some of the more important conclusions drawn by the author are as follows: Under normal meteorological conditions the increase in weight proceeded without interruptions. The leaf mass at first predominated, later that of the

roots. The percentage contents of the various nutrients in the raw mass varied little, but varied more markedly in the dry matter and diminished toward the end of the vegetation period, particularly in the roots.

The absorption of plant food occurred during almost the entire growing period, the maximum being reached in the case of potash and phosphoric acid somewhat before growth was completed. In case of nitrogen and ash the maximum was reached simultaneously with the maximum weight of organic matter.

After this maximum had been attained the total nutrients in the beets diminished. The decrease was greater in the leaves than in the roots; it was most marked in the case of potash and least in the case of nitrogen. The main cause of the decrease in the nutrients appeared to be the unfavorable climatic and meteorological conditions which caused the leaves to dry and fall. The absorption of nutrients was relatively greater in the first period of growth and outstripped the increase of organic matter. Fertilization favored regularity of growth, increased absolute weight, and enabled the beet sooner to reach the point of maximum utilization of plant food.

The percentage and absolute weight of sugar in the beets increased continuously during growth, but the largest increase took place in August and September. The ratio between the amount of sugar in the roots and the dry matter in the leaves increased toward the end of the vegetation period.

The influence of precipitation on the yield and quality of sugar beets, S. HERKE (*Kisérlet. Közlem., 14 (1911), No. 6, pp. 820–832*).—The author presents data from which he concludes that the more moisture there is available to the sugar beet during the growing season the greater will be the yield. The weight of foliage increases more rapidly than that of roots and the sugar percentage falls as precipitation increases, although the total sugar yields is increased. The nitrogen content, especially that of injurious nitrogen, decreases as precipitation increases.

Data on the chemical composition of sugar beets of different sizes, S. HERKE (*Kisérlet. Közlem., 14 (1911), No. 6, pp. 833–842*).—The author reports analyses of sugar beets of different weights from which he concludes that as the size increases the percentage content of sugar and dry matter decreases. On the other hand, the percentage content of nitrogen increases with the size. Potash, sodium, and crude ash continue to increase as long as the weight increases. The phosphoric acid percentage increases until the beet has reached a moderate size, after which it decreases.

Examination of the beets of the crop of the year 1909–10, DUSHKI, MINTS, and PAVLENKO (*Viestnik Sakh. Promuish., 1910, Nos. 37, 38, 39, 42, 43; abs. in Zhur. Opyitn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 1, pp. 131, 132*).—These pages indicate that the sugar content of Russian beets increased from 13.55 to 16.56 per cent between 1899 and 1909.

Growing tobacco for nicotin purposes (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 4, pp. 685, 686*).—An experiment conducted for the purpose of determining the profitableness of growing tobacco for use as an insecticide resulted in a considerable financial loss. Yellow Pryor and *Nicotiana rustica* were used in the experiment. *N. rustica* has been found to contain 6.53 per cent of nicotin. The author concludes that it is not commercially profitable to grow tobacco for nicotin production and cure and handle it in the ordinary manner, as this costs nearly as much as growing it for smoking purposes but yields a lower income.

Wheat and flour investigations, IV, R. W. THATCHER (*Washington Sta. Bul. 102, pp. 18*).—This bulletin consists of 2 papers, and continues previous work (E. S. R., 25, p. 859).

I. *A basis for selection of desirable seed for breeding for improvement of nitrogen content.*—Following a summary of available data, the author reports data based on analyses of 47 plants bearing 212 spikes, secured from 5 different varieties and grown in 3 different localities. He concludes that the composition of 1 row of spikelets is a sufficiently accurate counterpart of the other row of the same spike to serve as a basis for selection. The total and average weight of kernels and the weight of nitrogen vary with the length of straw, but the percentage of nitrogen decreases as length of straw increases. Differences in the composition of different spikes of the same plant are largely or wholly due to difference in nutrition or other environmental conditions and probably not hereditary. Eliminating the abnormally short or tall spikes, those remaining are fairly similar in composition, so that one spike may be selected from them for analysis as a representative of the other heads of the plant.

II. *The distribution of nitrogen in different parts of a wheat spike.*—Tables state the results of analyses made for the purpose of determining the distribution of nitrogen among the various parts of the individual spikes. The tabulated results as presented indicate that "the composition of the 2 opposite rows of spikelets, on the longitudinal halves of a spike of wheat, is practically identical," especially after rejecting the terminal spikelet which differs from the others. The average weight of kernel and of nitrogen is about the same in the upper and lower spikelets of the same head, but the kernels of the middle spikelets have the greatest nitrogen weight per kernel. The nitrogen percentage increases quite regularly from the tip of the spike downward. The outer rows invariably furnished the greatest weight of nitrogen and had the highest nitrogen percentage.

Results of seed analyses, J. B. S. Norton (*Maryland Sta. Bul. 162, pp. 235–241, figs. 5*).—The author quotes a table of standards of purity and germination of agricultural seeds from a source already noted (E. S. R., 24, p. 440), and states in another table the results of analyses of red, alsike, and crimson clovers, timothy, redtop, alfalfa, and vegetable, flower, and other seeds during 1910 and 1911.

Weeds: Their peculiarities and distribution, W. Brenchley (*Sci. Prog. Twentieth Cent., 6 (1912), No. 23, pp. 413–437*).—A brief article already noted (E. S. R., 25, p. 536) reported most of the data found in these pages. The author discusses methods of propagation of weeds and the classes of weeds associated with various soil types and crops, and describes briefly a number of parasitic weeds of special interest.

HORTICULTURE.

Miscellaneous greenhouse experiments, C. P. Close and T. H. White (*Maryland Sta. Bul. 158, pp. 97–109*).—The results of various experiments conducted during the past few years are reported.

An experiment was conducted for 3 years with roses, carnations, chrysanthemums, and sweet peas to determine the detrimental effect, if any, of sawdust bedding in cow manure. The plants were grown in soils enriched with cow manure and sawdust bedding, cow manure and litter, and cow manure without bedding. From the data as a whole the authors conclude that litter bedding in cow manure is not the best material and that sawdust in cow manure is not harmful, but that everything considered cow manure without any bedding material whatever is preferable.

Soil and fertilizer experiments with violets conducted for several years indicate that the violet plant is very impatient of any excess of soluble salts

in the soil, especially in hot weather. For this reason the authors recommend the use of plain cow excrement without the urine, to be worked into the soil a month or two previous to setting the plants. The soil should be a rather stiff garden loam, which has been preferably rested from cultivation for a season under some shade plant such as cowpeas.

In previous investigations conducted at the station in which chrysanthemums and lettuce were grown on the same soil for 8 years, it was found that although the soil was not disease-infected the plants did not grow as well as they should, notwithstanding the addition of lime (E. S. R., 20, p. 238). In 1907 the upper 6-in. layer of this old soil, which had previously formed a solid bed 20 in. deep, was placed in a new greenhouse on a 6-in. layer of coal ashes. Chrysanthemums, lettuce, and sweet peas were grown on this soil and on an annually renewed sod compost as ordinarily used for greenhouse work, the old soil being fertilized each year. The results for a period of 5 years indicate no material difference between the growth of the plants on the 2 beds. It is suggested that in the old bed of earth which was 20 in. deep any injurious salts or other matter that may have been carried downward immediately began to rise again as soon as evaporation at the surface commenced, whereas when only 6 in. of the soil was used on the bed of coal ashes, the injurious substances were washed down into the coal ashes by a heavy watering.

As tried for one season there appears to be no material difference in the yield of roses grown in a house extending north and south and in one extending east and west. A test of sprinkling roses from overhead water pipes as compared with the ordinary method of hose watering resulted in a considerable increased yield for the overhead system, although it appears that hose watering is more effectual in combating the red spider.

[Report on horticulture] (*Philippine Agr. Rev.* [*English Ed.*], *5* (*1912*), *No. 1, pp. 31–33*).—An outline is given of experiments with fruits and vegetables being conducted by the Philippine Bureau of Agriculture.

Vegetable growing in Alabama, P. F. Williams and H. M. Conolly (*Alabama Col. Sta. Circ. 14, pp. 42, figs. 8*).—This circular contains popular directions for growing the more important commercial vegetables, as well as vegetables for the home garden and those which have hitherto received little attention in Alabama. The subject matter is based both on experiments conducted at the College Station and on data collected in different sections of the State.

Truck crop potatoes, T. C. Johnson (*Virginia Truck Sta. Bul. 7, pp. 131–154, figs. 6*).—A popular treatise on potato culture in the tidewater region of Virginia. The phases discussed include soils, preparation of soils, rotations, manures and fertilizers, seed potatoes, planting, cultivation, treatment of potatoes for scab, spraying, harvesting, and marketing.

Some preliminary tests were conducted at the Truck Station to determine the relative merits of Virginia summer-grown, Virginia fall-grown, and Maine-grown Irish Cobbler potatoes for seed purposes as truck potatoes. In the test the northern-grown seed gave the best early yield but practically the same total yield as the Virginia fall-grown. The summer-grown seed gave the smallest yield throughout the test. It was also found impractical to carry Virginia summer-grown seed through the winter for planting the following spring, although it does appear feasible to hold potatoes which are harvested in the late fall for planting the next July. In the latter case, however, "it is deemed best to hold the crop in good root cellars until the middle of the winter and then place in cold storage. They should go into storage before the eyes begin to swell."

Orchard management, C. I. LEWIS (*Oregon Sta. Bul. 111, pp. 96, figs. 41*).—This is a popular treatise on fruit and nut growing in Oregon. Consideration is given to the adaptability of the State to fruit growing, clearing and preparing land, planting operations, intercropping and fillers, tillage, cover crops, shade crops, fertilizers, mulching, irrigation, pruning various fruits, orchard rejuvenation, thinning, dwarf fruits, varieties for various localities, the home orchard, pollination, winterkilling, frost and frost fighting, budding and grafting including also walnut grafting and nursery grafting, and protection from rodents and sunscald.

The appendixes contain a bibliography on fruit culture and a list of fruit growers' associations in Oregon.

Orchard heating, C. G. WOODBURY and J. W. WELLINGTON (*Indiana Sta. Bul. 154, pp. 71–96, figs. 17*).—This bulletin describes a comparative test of various coal- and oil-burning orchard heaters conducted in May, 1911. Since the temperatures were not sufficiently low to destroy the fruit blossoms, the data secured have to do with the comparative value of the heaters rather than with the crop saving effect of the heat developed in these tests.

At the price quoted for oil and considering the slow and unsatisfactory performance of the coal heaters in the test, the oil heaters appear to be preferable for use in Indiana. The effective burning time of the heaters is about 4 hours, or considerably less than is usually advertised. Considering the necessity of a reserve of extra heaters for emergency, fuel supply for several successive nights, and cost of labor, the initial investment to prepare for protecting a 10-acre orchard from frost injury is estimated at about $500.

The authors conclude that in the vast majority of Indiana orchards spraying, pruning, and good management must become a rule instead of an exception before orchard heating will pay.

Orchard heating, C. G. WOODBURY and J. W. WELLINGTON (*Indiana Sta. Bul. 154, popular ed., pp. 3–8, figs. 7*).—A popular edition of the above.

Lime and sulphur solutions, G. E. STONE (*Massachusetts Sta. Circ. 31, pp. 4*).—A popular circular based upon the literature on the subject relative to the use of self-boiled and concentrated lime-sulphur mixtures as summer sprays for fruit diseases.

Pedigreed nursery stock, U. P. HEDRICK (*New York State Sta. Circ. 18, pp. 8*).—A discussion of this subject in support of the author's contention that there is nothing to gain in the purchase of nursery stock sold with a pedigree.

Popular fruit growing, S. B. GREEN (*St. Paul, Minn., 1912, 4. ed., rev., pp. 328, figs. 132*).—In the present edition of this work (E. S. R., 21, p. 546) some rearrangement of the subject matter has been made in order to conform more closely to the usual plan of teaching fruit growing in American schools and colleges.

Suggestions for growing home fruits, A. B. MCKAY (*Mississippi Sta. Bul. 146, pp. 17*).—This bulletin contains popular suggestions for the planting and care of home fruits, including orchard and bush fruits, grapes, and strawberries.

Fruits of the Hawaiian Islands, G. P. WILDER (*Honolulu, 1911, rev. ed., pp. 247, pls. 121*).—This work comprises descriptions and illustrations of the indigenous and naturalized fruits of the Hawaiian Islands.

Marketing horticultural products, P. WORK (*Penn. Dept. Agr. Bul. 202, 1911, pp. 35, pls. 34*).—In this popular treatise introductory considerations deal with the importance, history, complications, and general principles of marketing. The methods practiced by successful horticulturists are then discussed under the general headings of preparation, transportation, and disposition.

A short bibliography on the subject is appended.

Commercial apple growing, C. G. Woodbury and W. M. Richards (*Indiana Sta. Circ. 30, pp. 3–124, figs. 72*).—This circular discusses in detail the various problems of commercial apple growing in Indiana under the following general headings: History and present status of Indiana apple growing, the young orchard, pruning, orchard management, spraying, and renewal of old orchards. An appendix contains information relative to horticultural publications, books, and materials needed by the commercial horticulturist.

Apple growing in Mississippi, H. C. Thompson (*Mississippi Sta. Bul. 147, pp. 15, figs. 5*).—A brief popular treatise on apple culture, discussing the future of the apple industry in Mississippi, location and site, soils for apples, varieties to plant, laying out the orchard, buying trees, planting operations, cultivation, orchard cropping, fertilization, pruning, and insects and diseases of the apple and their control.

Peach culture, C. P. Close, W. R. Ballard et al. (*Maryland Sta. Bul. 159, pp. 111–190, figs. 31*).—This constitutes a popular treatise on peach growing in Maryland. The phases discussed include natural conditions, soils and soil improvement, exposure and drainage, nursery and planting operations, pruning, cultivating and cropping young orchards, cover crops, fertilizers, orchard renovation, thinning the fruit, orchard heating, harvesting and packing, propagation of peaches, varietal descriptions, estimated data on the cost of growing a peach orchard, and peach diseases and insects and their control.

Grape culture, F. W. Gladwin (*New York State Sta. Circ. 19, pp. 8*).—This circular contains directions for growing grapes. The phases discussed include location of the vineyard, soils, drainage, preparation of soil, selection of vines and varieties, cross pollination, planting and planting distances, tillage, cover crops, intercropping, fertilizers, manuring, and spraying.

Variation in the floral structures of Vitis, M. J. Dorsey (*Bul. Torrey Bot. Club, 39 (1912), No. 2, pp. 37–52, pls. 3*).—In this paper the author brings together some general facts and observations relative to variation in the flowers of Vitis and records in tabular form some studies on the structure and numerical variation in the floral parts of certain species and varieties. A brief bibliography is appended.

Summing up the variations, the author concludes that variations in the flower of Vitis as a whole may be grouped into 2 classes: First, meristic, which includes differences in the number of the organs of the flower, and second, functional, including variations in the extent of development of the pollen, stigma, and ovules.

The defoliation of grapes, R. Villepigue (*Rev. Vit., 36 (1911), No. 941, pp. 724–727, fig. 1*).—A summarized account is given of experiments conducted during the past 3 seasons relative to the value of defoliation as an aid in the destruction of the cochylis and eudemis.

Where defoliation was not so severe as to interfere with the nutrition of the fruit, it appears to have augmented its weight and sugar content. The application of sprays was facilitated and in certain cases the attacks of the cochylis were lessened owing to the greater exposure of the vines to the sun. The greatest benefit was derived by defoliating early in the season. The decreased amount of foliage permitted the flowers moistened by rains to dry out and become more perfectly fertilized, hence the dropping of fruit was considerably lessened. Defoliation also appeared, to a certain extent at least, to prevent gray rot among the matured berries.

The defoliation of grapes, L. Ravaz (*Ann. École Nat. Agr. Montpellier, n. ser., 11 (1912), No. 3, pp. 216–245, figs. 2*).—An experimental study of the practice of defoliation is reported.

The results of the study as a whole indicate that defoliation is a special practice which may sometimes be used to advantage on weak-growing vines which, owing either to their nature or to their training, make a vertical growth. Vigorous-growing vines trained to wire trellises seem to benefit less or even to suffer from defoliation. The improvement by defoliation is manifested chiefly in a better quality of wine.

Reconstitution of vineyards in the Province of Trapani, Sicily, R. Marès (*Bul. Off. Gouvt. Gén. Algérie, 1912, No. 4, Sup., pp. 35–93*).—This report, which consists of a review of the work of reconstituting phylloxera-infested vineyards in Sicily, is presented with special reference to the reconstitution of similarly infested vineyards in Algeria.

Strawberries, C. P. Close, W. R. Ballard, T. H. White et al. (*Maryland Sta. Bul. 160, pp. 193–220*).—This bulletin contains descriptions of the new varieties which have been fruited at the station during the past 4 seasons, and also of the older varieties not described in the station's previous bulletin on strawberries from which the cultural directions herein given have been largely taken (E. S. R., 19, p. 1144).

In addition to the descriptive notes, data are given for all the newer varieties showing the sex, percentage of stand, blooming period, season of ripening, and yield. The 10 best-yielding varieties for each of the past 4 seasons are tabulated.

Experiments in mulching strawberries with straw were continued during the seasons 1908 to 1911 inclusive. As indicated by the yields for the 4 years a plat not mulched but cultivated in the spring has yielded an average of 3,612 qt. per acre; a plat mulched in early winter and cultivated in the spring averaged 4,101 qt. per acre; a plat mulched during the winter but not cultivated in the spring averaged 4,275 qt. per acre; and the check plat, which was neither mulched nor cultivated, averaged 3,800 qt. per acre. In addition to the increased yield, the berries from the mulched plats were always brighter, cleaner, and much larger than those from the unmulched.

Brief notes are appended on strawberry diseases by J. B. S. Norton and on insect pests by T. B. Symons.

Strawberry culture, P. T. Cole (*Virginia Truck Sta. Bul. 6, pp. 103–128, figs. 7*).—A popular account of the methods used in growing strawberries in eastern Virginia, including a description of varieties tested on the grounds of the Virginia Truck Station.

Annona diversifolia, a custard apple of the Aztecs, W. E. Safford (*Jour. Wash. Acad. Sci., 2 (1912), No. 5, pp. 118–125, figs. 4*).—A new species of custard apple (*A. diversifolia*) is here described and illustrated.

The development of the avocado industry, F. W. Popenoe (*Pomona Col. Jour. Econ. Bot., 1 (1911), No. 3, pp. 135–148, figs. 8*).—A general survey of the results obtained in growing avocados, both in southern California and in Florida.

The mango in southern California, F. W. Popenoe (*Pomona Col. Jour. Econ. Bot., 1 (1911), No. 4, pp. 153–200, figs. 13*).—In this paper the author discusses the present status of and prospects for mango culture in California, describes the varieties which have proven promising in that State, and gives an annotated list of all of the better known mangoes.

The white sapote, F. W. Popenoe (*Pomona Col. Jour. Econ. Bot., 1 (1911), No. 2, pp. 83–90, figs. 5*).—The author gives an account of the results obtained in growing and fruiting the white sapote (*Casimiroa edulis*) in southern California, including a description of varietes now grown.

Coconut culture, O. W. Barrett (*Philippine Bur. Agr. Farmers' Bul. 17, 1911, pp. 19, pls. 4; Proc. Soc. Trinidad and Tobago, 11 (1911), No. 8, pp.*

383–400).—A popular treatise with special reference to the Philippine Islands. The principal phases discussed include seed, nursery, transplanting, cultivation, harvesting, copra, diseases and enemies, irrigation, and fertilizers.

Varietal adaptability (*Amer. Fruit and Nut Jour., 6 (1912), No. 93, pp. 13–15*).—This comprises a report to the National Nut Growers' Association, relative to the commercial value and the adaptability of some 92 varieties of pecans now grown in the South.

Our house plants and flowers, A. DAMMER (*Unsere Blumen und Pflanzen im Zimmer. Leipsic, 1911, pp. III+109, figs. 65*).—In this popular work consideration is given to the care and management of indoor plants and flowers, together with notes on the principal characteristics and special cultural treatment of the more important kinds.

FORESTRY.

Report of the superintendent of forests, C. R. PETTIS (*N. Y. State Forest, Fish and Game Com. Ann. Rpt., 16 (1910), pp. 13–126, pls. 49*).—This comprises a report of the New York State Department of Forestry for the year 1910. The subject matter is presented under the general headings of forest fires, forest products, reforesting, trespass, State forest problems, and the forest preserve.

The appendix contains an account of forest conditions in Warren County, by F. F. Moon (pp. 79–107); and in Oneida County, by J. W. Stephen (pp. 109–126).

Cooperative forestry work, E. SECREST (*Ohio Sta. Circ. 119, pp. 91–93*).—This circular outlines the nature of the cooperative assistance given to Ohio landowners in the management of timber tracts and woodlots and in the establishment of commercial tree plantations, shelter belts, etc.

The development of forestry in Vermont, A. F. HAWES (*Ann. Rpt. State Forester Vt., 3 (1911), pp. 44, pls. 5*).—This comprises a progress report of forest operations in Vermont for the year ended July 1, 1911.

Report of the superintendent of forestry, R. H. CAMPBELL ET AL. (*Dept. Int. Canada Ann. Rpt. 1911, pt. 7, pp. 133, figs. 24*).—This comprises the report of the work of the forestry and irrigation branch for the year 1910–11, including also the reports of the officials in charge of the different divisions.

Report on forest statistics of Alsace-Lorraine (*Beitr. Forststatis. Elsass-Lothringen, 1910, No. 29, pp. 129, figs. 17*).—This is the customary statistical review for the year 1910, relative to the administration of the state, public, and community forests in Alsace-Lorraine. Detailed and summarized data dealing with forest areas, silvicultural operations, products, revenues, expenditures, etc., are given, including a comparative summary for each year since 1872.

Official proceedings of the division of forestry of the Royal Prussian Ministry for Agriculture, Domains, and Forests, 1910 (*Amtl. Mitt. Abt. Forsten K. Preuss. Min. Landw. [etc.], 1910, pp. IV+51*).—This is the customary statistical review of the administration and management of the Prussian state forests and domains.

Communication on the results of the Saxony state forest administration in 1910 (*Tharand. Forstl. Jahrb., 62 (1911), No. 2, pp. 138–142*).—A statistical and financial statement of the work and results of the forest administration in 1910.

Swedish forestry, F. DIEPENHORST (*Tharand. Forstl. Jahrb., 62 (1911), No. 2, pp. 192–216*).—An economic study of state, corporation, and private forestry in Sweden, including also an account of the wood-using industries.

On the determination of the plant food requirements of forest soils, H. VATER (*Tharand. Forstl. Jahrb., 62 (1911), No. 2, pp. 217–271*).—In continuation of previous studies conducted by the Saxony forestry experiment station (E. S. R., 22 p. 713), a further report is given of methods used in studying the

composition and fertilizer requirements of forest soils, including the results secured to date from 16 experiments.

From the investigation as a whole, the author is led to conclude that the fertilizer requirements of forest soils can be determined more accurately by the use of pure chemicals in preference to costly manures. By using pure chemicals the soil requirements of many other substances in addition to lime, potash, phosphoric acid, and nitrogen can be more readily studied. Likewise the results secured from pure chemicals are more uniform than are those secured with variously constituted manures. In order to counteract the effect of the varying composition of forest soils, it is recommended that each chemical be tested in from 3 to 6 different plats.

Light as a production factor in forestry, R. Beck (*Tharand. Forstl. Jahrb., 63 (1912), No. 1, pp. 4–28*).—A review of the present knowledge of the subject, in which consideration is given to the physiologic and economic importance of light in the forest.

Light measurements in spruce stands, E. Ramann (*Allg. Forst u. Jagd Ztg., 87 (1911), pp. 401–406*).—Since 1905 the author has made measurements of the light intensity in various forests by the use of a selenphotometer. The present paper comprises a study of the measurements secured in spruce stands.

Chestnut in Tennessee, W. W. Ashe (*Tenn. Geol. Survey Bul. 10, Extract B, 1912, pp. 35*).—This comprises the results of a survey conducted cooperatively by the Forest Service of this Department and the State Geological Survey of Tennessee. The study is presented under the general headings of the commercial outlook, distribution, silvical characteristics, diseases and defects, forest types and associated trees, growth of individual trees, and management with reference to both pure and mixed stands.

Varieties of willows, W. P. Ellmore and T. Okey (*Jour. Bd. Agr. [London], 18 (1912), No. 11, pp. 906–915*).—This comprises economic descriptions of the important basket willows.

Notes on Western Australian eucalypts, including description of new species, J. H. Maiden (*Jour. Nat. Hist. and Sci. Soc. West. Aust., 3 (1911), No. 2, pp. 165–190*).—These notes are based on field observations made by the author in Western Australia during 1909, together with a few additional notes from other sources.

Tapping experiments with high and low crowned Manihot glaziovii trees, A. Zimmermann (*Pflanzer, 8 (1912), No. 1, pp. 1–6*).—The author finds that although the branches of low-crowned trees yield about 12 per cent more rubber than the corresponding trunk parts of high-crowned trees, the cost of tapping is at least 30 per cent higher. The results in general indicate the advisability of growing trees with relatively high trunks.

The gutta-percha and rubber expedition of the Colonial Economic Committee to Kaiser Wilhelm Land, 1907–1909, R. Schlechter (*Die Guttapercha und Kautschuk Expedition des Kolonial Wirtschaftlichen Komitees wirtschaftlicher Ausschuss der Deutschen Kolonialgesellschaft nach Kaiser Wilhelmsland, 1907–1909. Berlin, 1911, pp. VI+171, pls. 10*).—This report to the German Colonial Society embraces the results of an expedition made to Kaiser Wilhelm Land in 1907 to 1909 to study the gutta-percha and rubber industries of that country. Part 1 consists of a chronological account of the expedition. Part 2 contains the information secured relative to the production of rubber, gutta-percha, and other useful plants, as well as botanical notes and maps showing areas of production and the course of the expedition.

Rubber and gutta-percha, edited by W. R. Dunstan (*Colon. Rpts., Misc. [Gt. Brit.], 1912, No. 82, pp. IV+263–447*).—The reports on rubber here brought together relate chiefly to the composition and quality of the rubber furnished

by well-known rubber-producing trees, the reports having nearly all been made at the request of the governments of the British Colonies concerned and being based upon investigations and analyses conducted in the Scientific and Technical Department of the Imperial Institute. A summary of reports relating to the utilization of the oil of the seeds of the Para rubber tree as a substitute for linseed oil and of the meal as a feeding stuff for cattle is appended.

DISEASES OF PLANTS.

The principal plant diseases in 1906, J. L. SHELDON (*West Virginia Sta. Rpt. San José Scale, etc., 1905–6, pp. 29–39, pl. 1*).—Lists are given of some of the principal plant diseases observed, the arrangement being alphabetical by host plants.

The injury due to smut fungi, I, D. HEGYI (*Kisérlet. Közlem., 14 (1911), No. 5, pp. 728–732*).—The author gives in Hungarian the findings from his investigations on the loss to the wheat crop through stinking smut. Injuries are divided in this report into evident and hidden, the former affecting the ears of the maturer plants and the latter the younger plants.

The injuries of these 2 sorts were found to be variable both as to their absolute quantity and their ratio. One lot gave percentages of 34.35 and 28.27, respectively, or a total of 62.62 per cent of plants injured; a second gave only 8.95 and 15.54 per cent, respectively, or a total of 24.49 per cent.

On the chemistry of the higher fungi.—VIII, Stinking smut of wheat (Tilletia levis and T. tritici), J. ZELLNER (*Monatsch. Chem., 32 (1911), No. 10, pp. 1065–1074*).—In continuance of former reports (see page 750), this communication gives the results of a comparative examination of the chemical composition of *T. levis* and *T. tritici*.

These at first sight are in close agreement, although differences appear. It would be possible, it is claimed, to distinguish between the spores of the 2 species by chemical means alone. The author, therefore, suggests the employment of chemical means in separation of species where other methods are not practicable.

Experiments with smut preventives, R. SOUTTER (*Queensland Agr. Jour., 28 (1912), No. 1, pp. 1–5*).—A report is given on experiments on the treating of wheat for the prevention of stinking smut. The grain was infected by breaking the smut balls over the wheat and thoroughly mixing, after which it was treated and sown. As treatments the author tested solutions of carbolized wheat protector, formalin, sheep dip, copper sulphate, copper sulphate and lime, brine, and arsenic.

Of the lots treated with carbolized wheat protector, formalin, and arsenic 100 per cent was clean, as compared with 42 per cent for the control plat. The use of brine was without any appreciable effect, as was also the sheep dip.

The author states that the results, which are based on a single year's experiments, show little except that treatment with copper sulphate and copper sulphate and lime were of value, and indicate the desirability of continuing the experiments.

Root and culm infections of wheat by soil fungi in North Dakota, T. D. BECKWITH (*Phytopathology, 1 (1911), No. 6, pp. 169–176*).—In continuation of a preliminary report (E. S. R., 23, p. 451), the author gives an account of investigations conducted at the North Dakota Station on the infection of wheat by various fungi from the soil. This subject has been under investigation since 1907 and has included quantitative analyses made from soil solutions, as well as studies of the culm, roots, etc.

From soil samples taken at a depth of 2 in. below the surface cultures of fungi were made, and the author found 2 species of Fusarium, 2 of Colletotrichum, and 1 each of Macrosporium, Alternaria, Spicaria, Verticillium, Rhapalomyces, Cephalothecium, and Helminthosporium.

Following these studies a series of cultures was carried on to determine what species would affect the wheat culm. These investigations showed that Colletotrichum, Macrosporium, Helminthosporium, and Cephalothecium were all found on the nodes and internodes of the wheat.

In 1910, when the season was much drier than in 1909, the observations were continued and extended to include studies of the fungi occurring on the roots. In nearly all cases Colletotrichum, Fusarium, or Macrosporium developed from specimens of wheat roots sterilized and placed in cultures. Check tests from virgin soil did not show these fungi in any considerable amount, and this is believed to be additional evidence that a part at least of the deterioration in yield in wheat fields in the Northwest is due to infection from soil fungi or from spores of the same in wind-blown diseases.

A new disease of lupines, G. Severini (*Staz. Sper. Agr. Ital., 44 (1911), No. 5–6, pp. 414–416*).—The author reports on a disease of wild lupine (*Lupinus perennis*) observed in the summer of 1910 near Perugia and claimed not to have been previously described. Descriptions are given both of the diseased plant and the new fungus. The fungus is thought to be a species of Anthostomella. The question is discussed as to whether or not this is identical with the species found by L. Montemartini to infect sulla (*Hedysarum coronarium*) causing a leaf spot disease thereon, and by him named *A. sullæ* (E. S. R., 24, p. 47).

Variation of varieties of beans in their susceptibility to anthracnose, M. F. Barrus (*Phytophathology, 1 (1911), No. 6, pp. 190–195, pl. 1*).—During the spring of 1910 a study was made of 161 varieties of beans planted in hills in a field and a duplicate set in tin cans placed in soil out of doors to determine their susceptibility to the bean anthracnose fungus (*Colletotrichum lindemuthianum*). Considerable difference in the susceptibility of varieties was noticed in the field, although most of the varieties of the common bean were found more or less susceptible.

During the fall of the year some students continued the study. The fungus was isolated from diseased beans, and with these cultures inoculations were made of some varieties that had proved susceptible as well as one that had hitherto proved resistant. The experiments were repeated several times with the same general result, indicating that there is a considerable difference in the infecting power of different strains of the organism.

In conclusion the author states that he has not found any variety of *Phaseolus vulgaris* that is resistant to every strain of the bean anthracnose fungus tested. Some are less susceptible than others, and it may be that certain varieties that have not come under his observation may prove entirely immune.

Black root rot of beets, D. Hegyi (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 2, pp. 153–159; abs. in Bot. Centbl., 119 (1912), No. 1, p. 19*).—The author asserts that this rot, ascribed to *Phoma tabifica*, *Pythium debaryanum*, and *Bacillus mycoides*, is to be combated by employing only well-dried seeds. A water content of less than 10 per cent should be maintained in order to secure exemption from this disease.

Finger-and-toe disease, W. E. Collinge (*Gard. Chron., 3. ser., 50 (1911), No. 1287, p. 150*).—The author states that lime followed by a dressing of sulphur is much better for the control of the club root of cruciferous plants than the use of lime alone. A field known to be badly infested was treated

in the autumn of 1909 with a dressing of about 1,500 lbs. of unslaked lime per acre, followed in the spring of the year by an application of about 500 lbs. of sulphur per acre. Upon this an excellent crop of Swedish turnips was produced, and the roots were practically free from disease. Only in one corner of the field was there any disease noticeable. A part of this tract was given a second treatment at the rate of about 1,200 lbs. of unslaked lime to the acre, applied in the autumn, followed in the spring with sulphur as previously. When the crop was harvested, no trace of the disease was found.

The occurrence at Ardrossan of the corky scab potato disease, D. A. BOYD (*Glasgow Nat., 3 (1911), No. 3, pp. 82–85*).—The author reports on the occurrence in Scotland of the corky scab potato disease, due to *Spongospora scabies*, and gives a description of the fungus, its methods of attack, and suggested remedies.

The nematode gallworm on potatoes and other crop plants in Nevada, C. S. SCOFIELD (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 91, pp. 15, figs. 20*).—There is said to have occurred in 1910 and 1911 in certain irrigated potato-growing districts in Nevada an outbreak of a potato disease due to nematodes (*Heterodera radicicola*). In order to supply the demand for information as to the cause, spread, and possible remedies a compilation has been made, bringing together such available information as would be useful to potato growers and others. The life history of the nematodes, sources of infection, susceptibility of other plants, and possibilities of eradication are discussed. The use of clean seed and nonsusceptible crops is recommended. Where these pests become established in fields they are difficult of eradication, but where possible flooding the ground and keeping it covered for a period of several months will destroy the nematodes and their eggs. Where nonsusceptible crops are used the nematodes will ultimately be greatly reduced in number owing to a lack of suitable food plants.

List of fungoid parasites of sugar cane observed in Trinidad, L. H. GOUGH (*Dept. Agr. Trinidad and Tobago Bul., 10 (1911), No. 69, pp. 177–181*).—A list of about 15 species of fungi that are known to occur parasitically on sugar cane in Trinidad is given, with notes on some of the more important literature.

Trichoderma köningi the cause of a disease of sweet potatoes, M. T. COOK and J. J. TAUBENHAUS (*Phytopathology, 1 (1911), No. 6, pp. 184–189, pls. 2*).—In the fall of 1910 the authors began a study of the sweet potato disease known locally as ring rot. It occurs as dry rot which spreads in all directions from the point of origin and completely girdles the root, forming a well-defined ring or band of discolored tissue.

An examination of roots failed to reveal any sign of spores or other structures by which the organism could be determined. Cultures produced the fruiting organs, and at first the fungus was supposed to be *T. lignorum*, but material submitted to others led to its determination as *T. köningi*. A number of sweet potatoes were inoculated with this fungus and within 2 weeks 100 per cent infection was secured. Other potatoes inoculated with *T. lignorum* gave about 50 per cent infection, with slightly different symptoms. The authors state that both these species are the cause of storage rots of the sweet potato, but that *T. köningi* is of the greater importance.

A disease of tobacco in Southern Italy, A. SPLENDORE (*Bol. Tec. Coltiv. Tabacchi [Scafati], 10 (1911), No. 3, pp. 141, 142, pl. 1; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, pp. 1773, 1774*).—Under the name "bassarà" or "verderame" a disease of tobacco in Italy is described.

It is characterized by the occurrence of green spots on the cured leaves. Sometimes the spots are isolated, while at other times a number are grouped

together and more or less confluent. Generally they appear along the middle of the leaf, the edges, tips, and petioles being free. The differences in color are very slight while the leaves are attached to the plant, but upon curing the green areas become conspicuous. A microscopical examination of the leaves showed a decided thickening of the mesophyll in the areas that remained green as compared with the normal leaf. The disease seems most prevalent on the so-called oriental varieties of tobacco. The cause of the trouble appears to be not definitely determined.

Preliminary note on silver leaf disease of fruit trees, H. T. Güssow (*Phytopathology, 1 (1911), No. 6, pp. 177–179, pl. 1*).—The author reports observing in Nova Scotia in November, 1909, the first authentic case of the silver leaf disease in America. He has since found about 60 trees affected by this disease in different localities. Although in Europe a number of species of plants are known to be attacked, so far only plums and apples have been so noted in Canada. Records are given of the disease in various countries, and the author's observations seem to confirm those of Pickering that the disease is due to the fungus *Stereum purpureum* (E. S. R., 24, p. 349).

Some frost injuries of fruit trees, G. Lüstner (*Deut. Obstbau Ztg., 1912, No. 3, pp. 50, 51, figs. 2*).—Pursuant to a former article by him (E. S. R., 25, p. 847), the author briefly describes some injuries by freezing to apple, pear, plum, peach, and apricot trees in various parts of Germany. The younger trees were the worse damaged. Some young fruits of injured trees showed a disposition to split, generally from the calyx outward, the wounded surface later forming a layer of cork-like material from the exposed tissue.

Remedy for chlorosis or tip burn in fruit trees (*Bol. Quind. Soc. Agr. Ital., 16 (1911), No. 16, p. 595; abs. in Mitt. Deut. Landw. Gesell., 26 (1911), No. 42, p. 582*).—The use of iron sulphate is recommended. In May or June a hole should be bored slantingly downward to the center of the trunk of a diameter equal to one-tenth of its depth. This should be packed full of the powdered crystals and sealed with wax.

The effects, it is stated, usually appear in a few days in the complete yellowing and fall of the leaves most affected (these being soon replaced by young healthy foliage), and the rapid recovery of color in neighboring leaves and twigs. If some remain yellow, it is advisable to repeat the treatment in the following year. Occasionally a third annual treatment is found to be necessary.

Investigations on the growth and spread of decay fungi in storage fruit, O. Schneider-Orelli (*Landw. Jahrb. Schweiz, 25 (1911), No. 3, pp. 225–246; Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 6–12, pp. 161–169*).—The author gives the results of his investigations on fruit rots caused by various organisms under different conditions. The principal forms studied were *Penicillium glaucum*, *Botrytis cinerea*, *Monilia fructigena*, *Glœosporium fructigenum*, *G. album*, *Fusarium putrefaciens*, *Cladosporium herbarum*, *Mucor piriformis*, *Rhizopus nigricans*, and a few others. Quantitative results are given as to rapidity of growth in cultures of different temperatures, the progress of each fungus with each of several varieties of fruit, and the germ content of the air in fruit cellars or in the open, with some observations by the investigator.

Stored fruit is subject to many factors as to the preservation of its freshness. Prominent among these are (1) the natural life period of the cells (varying with variety, ripeness when picked, etc.), (2) the activity of the rot fungi (affected by temperature and by the water content of the air and fruit), and (3) injuries; these being closely interrelated. While *M. fructigena* is very common on unripe and tree-ripe fruit, *P. glaucum* appears to be the chief cause of rot in the fruit cellars, *B. cinerea* seems to work more rapidly in the fruit body when once started, and *M. piriformis* and *R. nigricans* are common rots of

overripe pears but only occasional causes of damage to apples. The optimum temperature for growth of the rot fungi appears generally to be above 18° C., but growth continues until the freezing point is reached, although it is in general checked by lowering temperature, different fungi showing considerable differences in this respect.

Lime-sulphur wash for mildew of apple trees (Podosphæra oxycanthæ), J. Boll (*Deut. Obstbau Ztg., 1912, No. 3, pp. 47, 48*).—The author notes that while grape mildew (*Oïdium tuckeri*) appears to flourish best after heavy precipitation, the apple tree mildew seems to be favored by dry weather. For control of both these fungi sulphur is recommended.

In his experiments with lime-sulphur wash (1:20) after the outbreak had become general, the first application stopped the spread, and a second killed the remaining fungi, the dead leaves fell, and new leaves appeared. The author recommends earlier spraying, perhaps late in April or early in May for the first, and the latter part of June for the second, expressing further the opinion that the combat against this disease should really be begun by appropriate means in winter.

Pourridié of the grape, G. Verge (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 33 (1912), No. 5, pp. 132–136, pl. 1*).—This disease, which has been long known in Europe, is said to affect not only grapes but also fruit and forest trees, and is known to occur in France, Algeria, Italy, Switzerland, Austria, and Greece. The cause of the disease is attributed to several of the higher fungi, among them *Agaricus melleus, Dematophora necatrix, Rœsleria hypogœa*, and sometimes *Psathyrella ampelina*. The fungus spreads by means of rhizomorphs through the soil, and for its control the author suggests digging deep trenches about the affected plants so as to check the distribution of the mycelium in the soil.

The treatment of downy mildew, C. Caors (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 33 (1912), No. 5, pp. 140, 141*).—The author reports the successful treatment for a number of years of vineyards against attacks of downy mildew by an early spraying of the vines, taking particular care to wet the lower surfaces of the lower leaves, upon which he thinks the first attack is made by the winter spores being dashed upon them by rain. After the first spraying subsequent ones may be applied to the upper surfaces of the leaves, where most of the conidia find lodgment.

On the chemistry of the higher fungi.—VII, Raspberry root rot fungus (Hypholoma fasciculare), J. Zellner (*Monatsh. Chem., 32 (1911), No. 10, pp. 1057–1063*).—This is a continuation of previous reports (E. S. R., 24, p. 140) and gives the results of an examination made by the author on the chemical composition of this fungus.

Nematodes on the roots of coffee trees, O. Téllez (*Hacienda, 7 (1912), Nos. 4, pp. 119–121, figs. 4; 5, pp. 147, 148, fig. 1*).—A description is given of the attacks of nematodes on the roots of coffee, and an account presented of experiments with a number of different preparations for their control. Among the substances tested were calcium carbid, various alkaline sulpho-carbonates, carbon bisulphid, soap mixtures, petroleum, and tobacco.

The best results appear to have been obtained with calcium carbid. Eighty gm. of this substance was divided and placed in holes about 3 cm. in diameter and 25 cm. deep, situated at a distance from the trunk equal to about the length of the lower branches.

Hollyhock disease, G. Webb (*Gard. Chron., 3. ser., 50 (1911), No. 1288, p. 174*).—The author describes the successful treatment of hollyhocks against attacks of the rust (*Puccinia malvacearum*) by the application of a powder which consisted of 1 bu. of slaked lime, 1 bu. of soot, 4 lbs. of flowers of sulphur, and 2 oz. of finely powdered sulphate of copper. This mixture should be passed through a fine sieve and the plants dusted with the powder 3 or 4

times during the growing season in the morning while the dew is still upon them.

Bacteriosis of Iris pallida, F. CAVARA (*Bul. Soc. Bot. Ital., 1911, No. 6, pp. 130–134; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, pp. 1795, 1796*).—A preliminary note is given on a disease observed in beds of *I. pallida* in Florence in the spring of 1911. The plants showed a yellowing of the leaves, which finally faded and rotted at the base, accompanied by the rotting of the rhizomes.

A study of material showed that the disease was doubtless due to some species of bacteria. Inoculations of material isolated from leaves were always successful in producing the disease in the leaves but not upon the rhizomes.

The experiments seemed to indicate that the development of the microorganism is hindered during the hot dry season, and this conclusion was supported by observations made in the infected locality. The author believes that the disease is due to special circumstances, such as a fall of temperature in winter, causing the reserve starch to change into dextrin; or to excessive atmospheric moisture, favoring the development of the bacteria.

Similar diseases of Iris have been noted by different authors, and the differences between the organism occurring on *I. pallida* and the others are being studied.

A study of some Glœosporiums and their relation to a sweet pea disease, J. J. TAUBENHAUS (*Phytopathology, 1 (1911), No. 6, pp. 196–202, pl. 1, figs. 12*).—The author's attention was called in July, 1910, to a serious anthracnose of the sweet pea at the Delaware Experiment Station, and an investigation proved it to be the same as that reported by Sheldon in 1905 (E. S. R., 17, p. 264).

The disease occurs on the stems, flowers, and pods, but most severely on the latter. There is a general wilting of the affected parts, followed by dying, which begins at the tips of the younger shoots and works downward. The older parts of the plants are not immediately killed but may persist for some time after being attacked by the fungus.

The cause of the disease is said to be *Glomerella rufomaculans*, the cause of the bitter rot of the apple. Inoculation experiments confirmed this conclusion.

While studying this disease the author thought it desirable to determine whether other species of Glœosporium could produce an anthracnose of the sweet pea similar to that caused by the bitter rot organism of the apple, and inoculations were made with 5 different Glœosporiums taken from the May apple fruit, oak galls, sassafras leaves, Persea, and guavas. The Glœosporium from the May apple and from the oak gall were successful with puncture inoculations, and that from the sassafras leaves with atomizer inoculations as well as with puncture inoculations. No infection followed attempts to inoculate with the Glœosporium from Persea or from the guava.

Until perfect stages of these fungi are found, it is not thought possible to determine definitely the relation of all these species, although there is a possibility that the species occurring on the May apple, oak gall, and sassafras are the same as that reported upon as causing the bitter rot of the apple.

Heart rot of Quercus nigra, H. D. HOUSE (*Mycologia, 3 (1911), No. 4, p. 205; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, p. 1800*).—A brief note is given of the occurrence on living trunks of *Q. nigra* of the fungus *Pyropolyporus calkinsii*. This species is believed to cause heart rot similar to that due to *P. igniarius*, and the extension of range and discovery of a new host is believed to be of value to the forest pathologist.

Resistance of oak wood to dry rot (Merulius lacrymans), C. WEHMER (*Ber. Deut. Bot. Gesell., 29 (1911), No. 10, pp. 704–708, fig. 1*).—This investigation, which seems to have been induced by the assertion often made on apparently insufficient grounds that oak is peculiarly susceptible to the attacks of this rot, is claimed to show that oak is attacked with difficulty or not at all by this fungus. In a case observed by him, the author claims that while the pine underlayer of a parquet floor was decayed and full of the mycelium of *M. lacrymans*, which covered and enclosed some of the overlying oak blocks with a two-years' growth, he found the oak to be completely free from attack by the fungus. Laboratory experiments gave no other result. The oak was attacked by several other fungi, but *M. lacrymans* attacked other woods.

Further investigation is promised on the chemical and other characters of the woods in question.

The rot of scarlet maple produced by Dædalea unicolor, P. BACCARINI (*Bul. Soc. Bot. Ital., 1911, No. 6, pp. 100–104; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, p. 1800*).—The presence of fructifications of *D. unicolor*, frequently found on various forest trees such as hornbeam, beech, oak, and horse chestnut, is reported on *Acer rubrum* in the botanical gardens of Florence.

The author believes that the withering of the tree and the gradual decline of its foliage is due to the presence of this fungus, which has caused a special decay of the wood, transforming it into a white fibrous mass which breaks on the slightest occasion. The fungus is believed to be a wound parasite with a very feeble reaction opposed to the tree's activity, which accounts for its slow spread in living trees.

Injury to Pinus strobus caused by Cenangium abietis, B. FINK (*Phytopathology, 1 (1911), No. 6, pp. 180–183, pl. 1*).—In the summer of 1909 a group of 6 white pine trees at Oxford, Ohio, was found to be in a diseased condition, and an examination made by the author showed that a large proportion of the leaves and twigs on the northeast sides of 3 of the trees were dead or dying. On the twigs bearing the dead leaves were found black spherical tubercles, which upon identification proved to be *C. abietis*.

The diseased trees were from 1.5 to 2 ft. in diameter and about 55 years old. Other white pines growing within a few rods of the diseased ones were not affected, so far as could be observed. The 2 trees most severely affected died in August of the year in which the disease was first noticed. These were on the highest ground and were probably injured more than the other trees by the severe drought of the previous year. The disease is said to occur only occasionally and after periods of prolonged drought. This is apparently the first report of serious injury by this fungus in North America.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Insect pests of farm, garden, and orchard, E. D. SANDERSON (*New York and London, 1912, pp. XII+684, figs. 513*).—This work discusses the more important insects of farm, garden, and orchard at sufficient length to give a clear idea of their life history and habits and the best means of control. It is intended for use both by the student of economic entomology and by the practical farmer, gardener, or fruit grower. With the exception of citrus fruits, the insect enemies of practically all of the leading crops are considered. The author states that in general the discussion of insects and their control is based upon conditions east of the Rockies and that practically no consideration has been given to the conditions of the Pacific Coast or of the irrigated country of the far West.

Index-catalogue of medical and veterinary zoology, C. W. STILES and A. HASSALL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pt. 36, pp. 2705–2766*).—This part consists of addenda and corrigenda to parts 1 to 35.

Zoological record, D. SHARP (*Zool. Rec., 46 (1909), pp. XII+1404; 47 (1910), pp. XII+1406*).—These volumes record the zoological literature relating chiefly to the years 1909 and 1910, respectively.

Annual report of the entomologist for the year 1910–11, T. J. ANDERSON (*Dept. Agr. Brit. East Africa Ann. Rpt. 1910–11, pp. 161–171*).—A brief account is given of the work of the year, including notes on insects injurious to wheat, coffee, and maize.

Report of the work of the experiment station for the years 1905 and 1906 on the destruction of the San José scale, etc., J. H. STEWART (*West Virginia Sta. Rpt. San José Scale, etc., 1905–6, pp. 39, pls. 8*).—This is a report of the work of the station under a state law for the destruction of the San José scale and other dangerous insects, etc., during the year ended September 30, 1906. It contains a report of the entomological department by W. E. Rumsey and F. E. Brooks (pp. 9–26), which discusses nursery inspection work, the occurrence of San José scale in the State, and experiments with insecticides, and gives notes on other important insects of the year, including the codling moth, plum curculio, fall webworm, periodical cicada, rose chafer, woolly apple aphis, the greater chestnut weevil (*Balaninus proboscideus*), the lesser chestnut weevil, shot-hole borer, the catalpa sphinx, grape curculio, and scurfy scale, and a report of the bacteriologist noted on page 746 of this issue.

Insect notes for 1911, O. A. JOHANNSEN and EDITH M. PATCH (*Maine Sta. Bul. 195, pp. 229–248, pls. 2*).—Tests were made of various methods which have been recommended for the extermination of wireworms in corn. "The poisons and repellents used, usually so successful in combating insects under other conditions, were not efficient against wireworms in our tests. The successful growth of the peas leads one to believe that a rotation involving peas, or possibly peas and oats, a common fodder crop in this State, or clover, may be effectively employed, though whether wireworms are thereby actually reduced in number in the field so they may be less injurious upon susceptible crops planted later, future experiments alone will decide."

Among some of the more important insects mentioned are *Haltica carinata*, which attacked elms at Orono; the poplar weevil (*Cryptorhynchus lapathi*), which is a serious pest in some localities; the bean maggot (*Phorbia fusciceps*), which was reported to be the source of damage to young plants in various parts of the State; the apple maggot, which continues to be the most serious dipterous pest in the State; the brown-tail moth, which in many localities fed sufficiently upon the apple to be troublesome at picking and to destroy the foliage to a considerable extent; the spruce bud moth (*Tortrix fumiferana*), which occurred in alarming numbers; *Monodontomerus æreus*, a parasite of the brown-tail moth imported from Europe, which has gradually been spreading in Massachusetts and was discovered in Maine for the first time; etc.

An account of *Pemphigus tessellata* (*acerifolii*) on alder and maple, by Edith M. Patch is appended. Observations subsequent to those previously noted (E. S. R., 20, p. 856) are said to confirm the previous evidence and leave no room for doubt that the alder and maple represent 2 hosts of a single species, the alder being the summer home of the progeny of the migrants from the maple. It is not a simple case of alternate hosts, for the alder besides serving for summer host for the progeny of the maple migrants maintains a continuous series of apterous, viviparous, parthenogenetic females.

How contact insecticides kill, G. D. SHAFER (*Michigan Sta. Tech. Bul. 11, pp. 65, pls. 2, figs. 7*).—This bulletin consists of 2 parts, the first of which (pp.

8–53) deals with the effects of certain gases and insecticides upon the activity and respiration of insects, and the second (pp. 53–64) with some properties of lime-sulphur wash that make it effective in killing scale insects, especially San José scale. Abstracts of these have been previously noted (E. S. R., 25, p. 665). The investigations conducted and here reported in detail have been summarized by the author in the following general conclusions:

"Usually contact insecticides do not depend upon one property or means, alone, for their effectiveness, yet as a rule some one property is chiefly concerned. Alkaline washes, corrosive sublimate solution, and other fluids, which are capable either of dissolving or of precipitating certain constituents of insect tissues, are able to penetrate the chitin of insects into the tissues slowly. The weaker the surface tension of the fluid, apparently, and the thinner the chitin with which it is in contact the more rapid the penetration. Gases and vapors may penetrate the chitin of insects, especially through the tracheæ, into the tissues far more rapidly than liquids.

"It is through absorption into the insect tissues of the volatile portions of kerosene, gasoline, creolin, pyrethrum and such contact insecticides that they mainly become effective agents against insects. Vapors from these insecticides enter the tissues and become effective long before the liquids as such have time to penetrate the chitin. Kerosene, miscible oils, etc., are able to enter the spiracles and tracheæ of insects even when a 'closing apparatus' is present; but the comparatively rapid influence which such insecticides exert does not come from the plugging of the tracheæ alone.

"The general effects of vapors from gasoline, kerosene, carbon disulphid, creolin, and the rest upon insects are very similar to the effects of the vapor of ether. The nervous system seems to be especially affected. Small amounts of such vapors produce, at first, more or less excitement; then a period of uncertain movements; and finally in larger amounts anesthesia or narcosis. The respiratory activity is usually increased until after the insects become deeply affected, and it is then depressed.

"Certain gases and vapors (e. g., sulphur dioxid, ammonia, and hydrocyanic-acid gas), when present in respired air continue to be absorbed by insects while they are alive. For the most part, these gases are not given off when the insects are exposed to fresh air but become rather firmly fixed within the tissues.

"Insect tissues quickly become saturated with any certain percentage of the vapor of carbon disulphid, carbon dioxid, kerosene, gasoline, or similar vapor and no more (at that percentage) is taken up. Then when the insects are exposed to pure air, practically all of such vapors or gases are given off from the tissues again—but not quite as readily as they were absorbed.

"Starvation, serious mechanical injury, and ammonia gas were all found to reduce the value of the respiratory quotient below the value given when healthy strong insects are breathing pure air.

"The vapors of gasoline, carbon disulphid, kerosene, and To-bak-ine (i. e., nicotin), when present in sufficient amounts to bring the insects near death, cause the value of the respiratory ratio to rise above the value given by healthy, strong insects breathing pure air—i. e., these vapors depress the activity of oxygen absorption more than they do the carbon dioxid excreting activity. The insects tried could continue to give off small amounts of carbon dioxid when no oxygen was present to be taken up, as when they were kept in tested nitrogen, hydrogen, or carbon dioxid.

"The evidence gathered seems to indicate that the vapors of gasoline, kerosene, carbon disulphid and the like, after absorption into the insect body, become mainly effective through some tendency their presence exerts to prevent oxygen absorption by the tissues.

"Lime-sulphur is a special rather than a general contact insecticide. Its strong, persistent reducing power, and its ability to soften the wax about the margin of a scale insect like the San José scale are the important properties that make it efficient as a scalecide."

Concerning the action of potassium tellurate as a fly repellent, A. Mayer (*Monatsh. Prakt. Tierheilk., 23 (1911), No. 2–3, pp. 49–59*).—The action of kalium telluricum as a repellent for mosquitoes, flies, ticks, etc., when administered to domestic animals internally, as reported by Ochmann,[a] led the author to conduct the investigations here presented.

Tests were made on 9 horses and a cow by administering 10 gm. in doses of from 1 to 5 gm. in their drinking water. Negative results were obtained, the experimental animals continuing to be annoyed by flies. Experiments with oleum lauri show it to be a good insectifuge.

The existence of Schizotrypanum cruzi, Chagas, 1909, in Bahia (Matta de São João). Biology of Conorhinus megistus, E. Brumpt and Piraja da Silva (*Bul. Soc. Path. Exot., 5 (1912), No. 1, pp. 22–26, fig. 1*).—The occurrence of *S. cruzi* at Matta de São João, Bahia, situated about 800 km. from the point at which it was discovered by Chagas (E. S. R., 23, p. 585) is recorded, and notes are given on the life history and habits of *C. megistus*, the reduviid through which it is transmitted.

American Psyllidæ, V, D. L. Crawford (*Pomona Col. Jour. Ent., 3 (1911), No. 4, pp. 628–632, fig. 1*).—This paper, continuing previous work (E. S. R., 26, p. 148) includes descriptions of 4 species and 1 variety of psyllids new to science.

Natural enemies of the citrus plant lice, E. O. Essig (*Pomona Col. Jour. Ent., 3 (1911), No. 4, pp. 604–616, figs. 10*).—The insect enemies of citrus plant lice here considered are *Chrysopa californica*, lady beetles (*Coccinella californica, Hippodamia convergens, Coccinella abdominalis*, and *Scymnus sordidus*), syrphids (*Lasiophthicus pyrastri* and *Syrphus americanus*), and the 2 internal parasites *Aphidius testaceipes* and *Charips xanthopsis*.

Aphididæ of southern California, VIII, E. O. Essig (*Pomona Col. Jour. Ent., 3 (1911), No. 4, pp. 586–603, figs. 6*).—This contribution continues previous articles (E. S. R., 26, p. 149), and deals with all the commonly injurious plant lice of citrus in southern California, namely, *Aphis cookii* n. sp., *A. gossypii*, *Macrosiphum citrifolii*, the green peach aphis (*Myzus persicæ*), and the citrus aphis (*Toxoptera aurantiæ*).

Systematically eradicating the white fly in Texas, E. R. Kone (*Gulf Coast Citrus Fruit Grower, 1 (1911), No. 4, p. 18*).—A brief account of eradication work in Texas. It is stated that the freeze of January 2 and 3 defoliated all of the citrus fruit trees, thus confining white flies almost exclusively to other host plants, especially the cape jessamine.

The white flies of Japan, S. I. Kuwana (*Pomona Col. Jour. Ent., 3 (1911), No. 4, pp. 620–627, figs. 2*).—This paper deals with 11 species of Japanese Aleyrodidæ, of which 3 have been previously recorded and 8 are new to science.

Treatment for the San José scale and terrapin scale insects, T. B. Symons, E. N. Cory, and O. G. Babcock (*Maryland Sta. Bul. 161, pp. 221–234, figs. 3*).—This bulletin reports the results of experiments conducted during the season of 1910–11, the first part (pp. 222–227) dealing with the San José scale, and the second (pp. 227–231) with the terrapin scale.

The authors' observations and experiments show that there is little, if any, difference in the effectiveness of control work with the San José scale, whether done in the fall or spring. The experiments and observations in 1910–11

[a] Ztschr. Veterinärk., 23 (1911), No. 4, pp. 193–195.

throughout the State lead them to believe that a standard miscible oil, applied just before the buds open in the spring, is the best treatment for the terrapin scale. "The solution should be diluted at the rate of 1 part to 15 parts water. Treatment applied as late in the spring as possible before the buds open is less likely to prove injurious to buds or twigs. There is no doubt that treating peach trees with any of the oil sprays may at any time be attended by injury, either to buds or twigs, or both. Nevertheless, this is the only treatment that seems available, and even if some injury to the tree is occasioned, it is better to run the risk than allow the terrapin scale to continue to develop in the orchard."

The purple scale (Lepidosaphes beckii), H. J. QUAYLE (*California Sta. Bul. 226, pp. 319–340, figs. 12*).—This important scale was first described by Newman in 1869 in England as *Coccus beckii* and the following year by Packard in this country as *Aspidiotus citricola*. In 1876 Glover reported that it had been found in 1857 in Jacksonville, Fla., on imported lemons. It appears to have been introduced into California directly from Florida in 1888 or 1889. It is stated that at the present time the purple scale occurs in California in the counties of San Diego, Los Angeles, Orange, Ventura, and Santa Barbara. In addition to Florida and California, it is known to occur in this country in Louisiana and Colorado.

Next to the black and red or yellow scales, it is the most important scale occurring in the southern California citrus belt. "Its distribution is not so general as that of either the black, red or yellow, but where it does occur it is the most serious of them all, because it yields less readily to treatment. Where this scale occurs among others, fumigation work is directed primarily against the purple, and usually successful treatment against it readily controls the red or black scales. The purple scale infests leaf, branch, and fruit, often becoming completely incrusted upon these, but it is usually only a portion of the tree that becomes thus infested. The lower side or interior of the tree is where the insect thrives best, and here it is that the injury is most evident. . . . The scale causes a marked yellowing of the leaves and there is consequently a heavy dropping so that many of the branches will be completely denuded.

"The injury is due directly to the feeding, as is the case with the red scale, since no honeydew is excreted. The scales on the ripening fruit often have a tendency to delay the coloring, and a marked green spot will be seen about the scale while the rest of the surface is yellow. On account of their firm attachment to the fruit they are with great difficulty removed therefrom, so that the ordinary brushing or washing of the packing-house has little effect upon them.

"The economic status of this scale is due largely to its resistance to such treatments as fumigation or spraying. It is not a particularly prolific insect for the maximum number of eggs will not exceed 80, and there are not more than 3, or at most 4, generations a year. It is in the egg stage that it is most resistant to fumigation. This must be largely on account of the very complete protection afforded the eggs by the secretion of the ventral scale, which together with the dorsal scale completely envelops them. The only opening is at the posterior tip where the young upon hatching emerge."

"The complete list of food plants from which *L. beckii* has been recorded is as follows: Orange, lemon, citron, grapefruit, fig, olive, croton, oak, Elæagnus, *Banksia integrifolia*, *Taxus cuspidata*, *Cercidiphyllum japonicum*, *Pomaderris apetala*."

Technical descriptions are given of its stages, together with an account of its life history and habits. "The time required for the life cycle, from young to young, during the summer months is about 3 months and in winter may be prolonged a month or more longer. . . . During May, and also in June, young

scales begin appearing in large numbers, which is the first definite spring hatch. It is altogether likely that in many cases these are the progeny of the third generation. During the remainder of the summer young scales will be found continuously in considerable numbers. Eggs will be found at any season of the year, but during the winter months the young will appear mostly during the warmer periods."

Aspidiotiphagus citrinus, the only parasite thus far reared from the purple scale, has been known to occur in the State since 1891. Although in many sections of the citrus belt where the purple scale occurs little or no trace of the parasite has been found, in certain places parasitism is as heavy as with the red or yellow scale. *A. citrinus* is a strictly internal feeder, and attacks the scale only between the first and second molts. "The age of the scale when growth is stopped by the effects of the parasite, judging entirely from the condition of the scale, appears to be about 40 or 45 days, when the second molt would occur in about 50 or 55 days. During the past 2 years a large number of these parasites have been found issuing in December."

Predaceous enemies of this scale include several species of Coccinellidæ, especially *Rhizobius lopanthæ* and *Scymnus marginicollis*, together with the larva of Chrysopus and Hemerobius. Brief mention is made of 3 other species of Lepidosaphes that occur in California.

A bibliography of the literature issued subsequent to that listed in Mrs. Fernald's catalogue of the Coccidæ (E. S. R., 15, p. 278), prepared by E. R. Sasscer of the Bureau of Entomology of this Department, is appended.

On a muscardine of the silkworm not caused by Botrytis bassiana, J. Beauverie (*Reprint from Rap. Com. Admin. Lab. Études Soie Lyon, 14 [1911], pp. 31, pl. 1, figs. 13*).—The author here presents the results of a study of a disease of the silkworm which he finds to be due to *B. effusa* n. sp.

The work concludes with a bibliography of 31 titles.

Fighting the cotton worm (Alabama argillacea), W. E. Hinds (*Alabama Col. Sta. Circ. 10, pp. 7, fig. 1*).—This is a popular account which furnishes information in regard to the dusting outfit, poisons to be used, time of application, etc. Particular emphasis is placed upon the importance of being ready to poison without delay when the worms appear.

The control of the codling moth, A. L. Melander (*Washington Sta. Bul. 103, pp. 4–55, figs. 4*).—This bulletin summarizes the studies conducted since 1903, discussing the life history of the codling moth, number and strength of sprayings, the method of spraying, the ideal spray outfit and spray poison, rate of reinfestation, the principles underlying calyx spraying, other apple insects, objections to a single spray, etc.

The author recommends spraying with arsenate of lead 1 lb. to 50 gal. of water immediately after the blossoms fall, the application to be completed before the calyx lobes have closed, and using the Bordeaux type of nozzle as previously advocated (E. S. R., 22, p. 461). Tests made of ferrous arsenate gave excellent results, with no sign of scorching the foliage. Zinc arsenite also showed advantages. Analyses of commercial samples of arsenate of lead are reported.

A bibliography is given of the literature issued subsequent to the publication of Simpson's bulletin in 1903 (E. S. R., 15, p. 595).

On a new disease of the caterpillar of Bupalus piniarius, M. Wolff (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1910), No. 2, pp. 69–92, pl. 1*).—This is an extended discussion of a disease of *B. piniarius*, which is transmissible by its insect parasites, that resembles grasserie of the silkworm due to the *Chlamydozoon bombycis* of Prowazek. Two species, *C. prowazeki*, which at-

tacks *B. piniarius*, the nonne and gipsy moths, and *C. sphingidarum*, which attacks sphingids, are described as new to science.

A bibliography of 30 titles is appended.

A worm that attacks sugar cane in the Chanchamayo Valley, Peru, A. FERREYROS (*Rev. Indus. y Agr. Tucumán, 1 (1911), No. 9, pp. 20–26; Bol. Dir. Fomento [Peru], 8 (1910), No. 7, pp. 52–61*).—This paper deals with the injury caused by the sugar cane leaf-roller, *Omiodes accepta*. The 2 parasites *Macrodyctium omiodivorum* and *Chalcis obscurata* are mentioned as occurring in the valley.

The fruit tree leaf roller. A new pest of the apple in New York, G. W. HERRICK (*Rural New Yorker, 71 (1912), No. 4140, p. 263, figs. 4*).—The author reports that this leaf roller suddenly came into prominence in 1911 as a serious pest to apples and a minor one to pears at Bethany Center, N. Y.

The insecticidal action of pyridin and quinolin when used in combating the cochylis and eudemis moths, P. CAZENEUVE (*Rev. Vit., 36 (1911), No. 921, pp. 153–160; Rev. Hort. [Paris], 83 (1911), No. 14, pp. 319, 320*).—In combating the cochylis and eudemis moths, the author made use of commercial pyridin, which can be purchased at the rate of 2 francs per kilogram (about 17.5 cts. per pound).

Two applications consisting of 200 gm. of pyridin to a hectoliter of Bordeaux mixture (or Paris green, which is preferred by the author) were made before the blossoms opened and a third application while the vines were in bloom and the larvæ located in the blossoms. This resulted in the immediate destruction of many, while others dropped and succumbed on the ground, or transformed to pupæ on the stalks. As a result of this treatment, the second generation of moths, which emerge toward the end of July, is reported to have been small. In combating the pest at this time the author has used a fourth application consisting of 300 gm. of pyridin to a hectoliter of Bordeaux mixture, care being taken that the grapes are well covered with the spray.

A powder consisting of flowers of sulphur and hydraulic lime 35 kg. each, talc 28 kg., copper carbonate 1 kg., and trioxymethylene 1 kg. applied at the same time and while the grapes are yet wet is said to act as a repellent, formaldehyde gas being liberated and preventing the moths from ovipositing on the vines.

On the early stages of certain geometrid species, W. BARNES and J. MCDUNNOUGH (*Psyche, 19 (1912), No. 1, pp. 14–20*).—Studies of 7 species are recorded.

Destruction of flies abroad (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 60, pp. 1031–1033*).—Brief notes are given in regard to the occurrence of the house fly and of the use of fly paper, etc., abroad, particularly in European countries.

Report on fruit fly control, W. M. GIFFARD (*Hawaii. Forester and Agr., 9 (1912), No. 1, pp. 28–31*).—It is stated that up to the present time the Mediterranean fruit fly has been found in Hawaii infesting the following fruits: Strawberry and all other garden varieties of guava, peach, avocado, Chinese orange, mandarin orange, sweet orange, green peppers, fig, rose apple, star apple, mountain apple, coffee berry, wild guava, Chinese plum (*Horonhia emarginata*), mango, overripe papaya, varieties of lime, baby papaya (*Carica quercifolia*), *Carissa arduina*, Chinese ink berry, grapefruit, prickly pear, *Eugenia uniflora*, loquat, and "kamani" (umbrella tree) nut.

The mode of transmission of leprosy, T. L. SANDES (*Brit. Med. Jour., 1911, No. 2644, pp. 469, 470*).—From the data presented, the author concludes that "considering the enormous numbers of lepra bacilli in the infiltrated or ulcerated skin and nasal mucosa of an active 'tubercular' leper and the ingestion of bacilli by certain insects, direct contact and transmission by flies, fleas, mos-

quitoes, or other insects, are possible modes of spread of the disease; but such infection, if it ever does take place, is accidental and exceptional. Having found acid-fast bacilli answering as far as our imperfect tests permit to the characteristics of lepra bacilli in a considerable proportion (about 30 per cent) of specimens of *Acanthia lectularia* up to 16 days after feeding on lepers, there is reason to believe that this species of insect constitutes a very important agent in the spreading of leprosy."

The cacao beetle (*Dept. Agr. Trinidad and Tobago Bul., 10 (1911), No. 69, pp. 218, 219*).—A brief report of effective results obtained from trapping the cacao beetle as recommended in a paper previously noted (E. S. R., 25, p. 465).

Shot hole borers (Scolytidæ and Bostrichidæ), E. E. Green (*Trop. Agr. and Mag. Ceylon Agr. Soc., 38 (1912), No. 1, pp. 37–39, fig. 1*).—This paper includes an annotated list of 14 species of Scolytidæ that have been found associated with various economic plants in Ceylon.

The three destructive snout beetles that attack apples, F. E. Brooks (*Better Fruit, 6 (1912), No. 8, pp. 21–26, 73–75, figs. 17*).—The data here presented relating to the plum curculio, apple curculio, and apple weevil (*Pseudanthonomus cratægi*), are included in an account previously noted (E. S. R., 23, p. 160).

The present state of the knowledge of foul brood in bees, S. Korolev (*Viestnik Bakt. Agron. Stantsii V. K. Ferreĭn, 1910, No. 17, pp. 30–99; 1911, No. 18, pp. 15–33*).—In addition to an extended survey of the literature on the subject, the author describes the results of bacteriological examinations of honeycombs.

Ichneumonids and tachinids as intermediate hosts of Chlamydozoa, Wolff (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1910), No. 1, pp. 49, 50*).—The author reports having found the yellow disease or jaundice (grasserie) in pupæ, principally of *Bupalus piniarius*, received from West Prussia. Attention is called to the fact that the virus from Chlamydozoa carriers (ichneumonids and tachinids) will infect the caterpillar of the nonne moth, when inoculated, and that this will take place even after months of drying.

Some North American Cynipidæ and their galls, W. Beutenmüller (*Bul. Amer. Mus. Nat. Hist., 26 (1909), pp. 277–281, pl. 1; 28 (1910), pp. 117–136, 137–144, 253–258, pls. 10; 30 (1911), pp. 343–369, pls. 6*).—These papers, which constitute the sixth to tenth of a series of articles by the author on North American Cynipidæ and their galls (E. S. R., 22, p. 255), deal with the genera Eumayria, Belenocnema, Solenozopheria, and Compsodryoenus; Neuroterus; Aylax; Aulacidea; and Dryophanta, respectively.

The transmission of typhus fever, with especial reference to transmission by the head louse (Pediculus capitis), J. Goldberger and J. F. Anderson (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 27 (1912), No. 9, pp. 297–307, figs. 6*).—Experiments conducted with the body louse and head louse, here reported, have led the authors to conclude that the body louse (*P. vestimenti*) and the head louse (*P. capitis*) may become infected with typhus. The virus is contained in the body of the infected louse and is transmissible by subcutaneous injection of the crushed insect. It may also be transmitted by the bite of the body louse, and, it is believed, by that of the head louse as well.

Papers on deciduous fruit insects and insecticides.—Notes on the peach bud mite, an enemy of peach nursery stock, A. L. Quaintance (*U. S. Dept. Agr., Bur. Ent. Bul. 97, pt. 6, pp. 103–114, pls. 5*).—"For the past 15 or 20 years nurserymen in the East have complained of a well-defined trouble of peach nursery stock, resulting from injury to the tender terminal bud of the principal shoot. The injury causes the cessation of further upward growth of the shoot and results in the development from the lateral buds of numerous branches, a condition very objectionable in stock of this class where a single vigorous shoot is desired. There have been several references in literature to

this trouble, and entomologists are divided as to the cause, though in most instances a minute mite has been noted as associated with it." This mite has recently been found by Nathan Banks to be new to science and the name *Tarsonemus waitei* has been given to it.

In this paper the author has brought together the recorded facts concerning it, together with remarks on the injuries caused by some other species of Tarsonemus, including *T. oryzæ*, which infests the culms of the rice plant in Italy and produces the malady described by Negri under the name "bianchella; "*T. spirifex* (E. S. R., 19, p. 252); *T. ananas* (E. S. R., 11, p. 256); *T. bancrofti*, which injures sugar cane in Barbados and also occurs in Queensland; *T. culmicolus* (E. S. R., 12, p. 970); *T. latus*, which was found by Banks in some small mango plants in one of the Department greenhouses in Washington; and *T. pallidus*, which was found on a chrysanthemum in a greenhouse near Jamaica, N. Y.

There is said to be but little information available bearing on the control of this mite. Pruning out the lateral shoots from the injured trees, thus forcing one of the more terminal shoots, is said to have been followed by a Maryland nursery company with good results. It is thought that a contact spray, such as kerosene emulsion or whale-oil-soap solution, and especially the self-boiled lime-sulphur wash, will be effective.

The fecundity of the cattle tick and the various periods of its life. F. LAHILLE (*Bol. Min. Agr. [Buenos Aires], 13 (1911), No. 5, pp. 185–200, figs. 5*).—This paper deals largely with the oviposition of *Margaropus microplus*.

The relation of the sheep-tick flagellate (Crithidia melophagi) to the sheep's blood. L. D. SWINGLE (*Wyoming Sta. Bul. 91, pp. 3–16, figs. 5*).—This bulletin reports investigations conducted with a view to determining whether the flagellate *C. melophagi*, which in this country is found in the digestive tract of nearly 10 per cent of the so-called sheep tick (*Melophagus ovinus*), can be transferred to sheep's blood and if so, whether it is capable of producing any disease.

The studies have led the author to conclude that this "flagellate is not connected in any way with a sheep trypanosome, or any other parasite of the sheep's blood; that it is strictly an insect flagellate, no phase of whose life cycle is undergone in the sheep as a host; and, moreover, that it can not be communicated to the sheep by the bite of the tick, or by mechanical inoculation or by feeding."

The relation of Crithidia melophagi to the sheep's blood, with remarks upon the controversy between Dr. Porter and Dr. Woodcock. L. D. SWINGLE (*Trans. Amer. Micros. Soc., 30 (1911), No. 4, pp. 275–283*).—The data here presented have been largely included in the paper noted above.

The rôle of insects as carriers of disease. E. SERGEOIS (*Abs. in Jour. Amer. Med. Assoc., 58 (1912), No. 8, pp. 594, 595*).—This is a study of the bedbug as a carrier of disease, in which the author gives the anatomy and life history of the bedbug, and discusses the experimental work which has been done, especially in regard to relapsing fever.

He concludes that it is possible for the bedbug to be an intermediary for disease germs. "Ordinarily it plays the part merely of a carrier; seldom is it the host. In no disease is it of specific epidemologic importance, yet undoubtedly through bedbugs such diseases as relapsing fever and kala-azar remain endemic in certain places. It is known that infectious organisms may remain alive a long time in the bodies of bedbugs. In order for the infection to be transmitted, the micro-organism must escape from the crushed bedbug and come in contact with some abrasion in the skin, into which it must be impelled with some force; these conditions are liable to occur in scratching a

bedbug bite. Consequently the bedbug is a dangerous insect, and its extermination is a hygienic necessity."

FOODS—HUMAN NUTRITION.

Seasonal variation in the bacterial content of oysters, F. P. GORHAM (*Jour. Amer. Pub. Health Assoc., 2 (1912), No. 1, pp. 24–27*).—From the experimental data presented the author concludes that in warm weather the results of bacterial analysis of oysters "tally very well with the actual conditions as determined by the sanitary survey and therefore analyses may be used to determine whether or not certain oysters may be sold for human consumption. But during the cold weather oysters judged by analyses alone would be pronounced good although they came from within a short distance of a larger sewer outfall.

"We probably do not want to eat oysters which come from the immediate neighborhood of sewer outlets, even though they appear on analysis to be free from colon bacilli. Therefore, in order to exclude these oysters from the market in the winter time, the only reasonable method would be to set definite limits from sewer outlets, within which it shall be unlawful to take oysters or other shellfish for use as food."

The sanitary inspection of oyster grounds in the United States, C. A. FULLER (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1 (1910), Sect. 3, pp. 169–178*).—A digest of data.

Studies on chicken fat (*Jour. Amer. Chem. Soc., 34 (1912), No. 2, pp. 210–222*).—Previously noted from another source (E. S. R., 26, p. 767).

The relative ease of digestion of cheese as compared with beef, C. F. LANGWORTHY and R. D. MILNER (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1 (1910), Sect. 1, pp. 249–253*).—A summary and discussion of experimental data. (See also a previous note by Doane, E. S. R., 24, p. 665.)

Preliminary research on the chemistry of bread (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 4, p. 223*).—A brief note of investigations undertaken at the department of household science of the University of Illinois, to determine what chemical differences, if any, are characteristic of long process and short process breads.

Hard water and fermentation, O. J. FREED (*Oper. Miller, 17 (1912), No. 3, p. 166*).—On the basis of experience the author discusses the influence upon bread of the quality of the water used in mixing the dough.

"Where hard water is prevalent it is of great help to use more yeast or a higher temperature for the dough, or . . . [to] add in proportion with strong hard flour some softer winter wheat. Water with a little lime in it is the very best to use for rye dough. . . . Hard water will not produce as good results as soft water at its best. . . . The injection of steam into the oven not only helps to dextrinize and glaze the crust, but also serves the purpose of keeping the interior of the loaf moist by preventing too rapid evaporation, and so improves the loaf very much in crust appearance and flavor and renders it more palatable. . . .

"A water that would be rejected on analysis as unfit for drinking purposes should also be condemned by the baker."

The influence of the addition of foreign starches upon the quality of the dough, M. P. NEUMANN and K. MOHS (*Ztschr. Gesam. Getreidew., 4 (1912), No. 1, pp. 18–26, figs. 4*).—The authors discuss the value of potato starch prepared in various ways and rice preparations as baking adjuncts in the preparation of yeast-raised breads, and report the results of experiments from which they conclude that commercial pastes made of potato or rice meal may be

advantageously used. Their value, however, varies with the character of the flour with which they are combined, and is limited by the relatively small quantities which can be successfully employed. The question whether according to German law such additions would be considered falsifications is also discussed.

A standard for vinegar (*Brit. Food Jour., 14 (1912), No. 157, p. 6*).—Data are given regarding the standards for vinegar, malt vinegar, and artificial vinegar proposed by the local government board.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 139, p. 1; 140, pp. 3; 141, pp. 2*).—These decisions have to do with the use of the term "sweet oil," the labeling of vinegars, and the labeling of maraschino and maraschino cherries.

Experience in the working of food legislation in Canada, A. McGill (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 6, pp. 57–66*).—A digest of data.

The municipal chemical office of Buenos Aires, R. Schatz (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.] 2 (1910), Sect. 6, pp. 67–71*).—This laboratory investigates food products and drinking water and other beverages, and inspects restaurants and shops where food products are manufactured or sold, etc. Its work is spoken of in some detail.

Research work in canning and cooking (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, p. 142*).—A brief summary of a paper containing 2 reports presented at the Second International Congress of Alimentary Hygiene and the Rational Feeding of Man, Brussels, October, 1910. The first report, by Florence Gaumnitz, summarizes canning and cooking tests with meats and vegetables; the second, by Mary L. Bull, the results of experiments in canning vegetables by household methods.

Temperature and cooking tests with fireless cooker, Helen B. Thompson (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, p. 143*).—A brief summary of a paper presented at the Second International Congress of Alimentary Hygiene and the Rational Feeding of Man, Brussels, October, 1910, reporting data regarding the conductivity of different packing materials and methods of construction of fireless cookers, the results of numerous temperature tests, methods of using fireless cookers, and the results of cooking experiments. Some recipes were also included.

The work was carried on at the Rhode Island State College.

Economy and system in the bakery, E. Braun (*Cincinnati, 1912, pp. 192, figs. 21*).—This volume of suggestions and other data is designed for the use of bakers. Among the subjects considered are yeast, fermentation, yeast foods, and bread diseases; flour, gluten, chemical, and practical tests; dough making, the proper temperature, bread formulas, and standards; heat, combustion, fuel, and ovens; and modern bread making, machinery, and equipment.

Dietary study in dining hall of Rhode Island State College, Helen B. Thompson et al. (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, p. 143*).—A brief summary of a paper presented at the Second International Congress of Alimentary Hygiene and the Rational Feeding of Man, Brussels, October, 1910.

Dietary for one week for a family of five at a cost of $5.50, Electra H. Cobb et al. (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, pp. 117–122*).—Menus and other information are provided regarding a dietary designed to supply nutrients and energy corresponding to commonly accepted dietary standards. The dietary outlined was prepared for the use of social settlement workers among factory operatives.

The diet of the Japanese, S. SAWAMURA (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 223–230*).—Statistics regarding the kinds of food used in Japan and information regarding the preparation of food, the quantity of food consumed, and similar topics are included in this digest of data.

Children's diet in home and school, with classified recipes and menus, LOUISE E. HOGAN (*New York, 1910, rev. ed., pp. VIII+194+14, figs. 2, dgms. 4*).—The author discusses the feeding of infants and young children, including summer diet, winter diet, food in illness, school luncheons, supplementary feeding for feeble and average school children, and related questions, and gives sample menus for children of different ages and classified breakfast, dinner, and supper menus.

New matter has been added in this edition regarding school luncheons, the peptonization of foods, and other subjects.

The feeding of school children, CAROLINE L. HUNT (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, pp. 115, 116*).—A summary of a paper presented at the Second International Congress of Alimentary Hygiene and the Rational Feeding of Man, Brussels, October, 1910.

Loss and regeneration in the life process, M. RUBNER (*Sitzber. K. Preuss. Akad. Wiss., 1911, XX, pp. 440–457; Arch. Anat. u. Physiol., Physiol. Abt., 1911, No. 1–2, pp. 39–84; Abs. in Chem. Zentbl., 1911, I, No. 22, pp. 1598, 1599; Zentbl. Physiol., 25 (1911), No. 16, pp. 693, 694*).—In this discussion the author summarizes data having to do with the renewal of living substances.

The minimum protein necessary for maintenance, he concludes, must vary with different foods, since the nitrogenous materials present in different foodstuffs have different values. The proteins from several sorts of meat and milk proteid have "full value," since they may replace quantitatively the nitrogen loss following a diet lacking this constituent. That milk protein has a very high value may be seen from the fact that protein makes up only 5 per cent of the total energy metabolized by a nursing child. In contrast to meat and milk proteids those derived from legumes have a markedly low value. Determining the amount of a protein of "full value" which satisfies the minimum nitrogen requirement gives a measure of the quantity of protein which the body constantly loses.

The "utilization quota," according to the author's experiments with dogs, birds, and man, shows that protein supplies about 4 per cent of the total energy metabolized. In recent experiments the nitrogen requirement has been reduced to an extremely small value, namely, about 30 mg. per kilogram of body weight. Calculating the "utilization quota" from the urine only gave a value representing about 1/1,000 of the total nitrogen of the body.

The nitrogen in the body is present in part in living substance and in part in skeletal substance, but it may be assumed that both sorts are concerned in body losses. The body uses nitrogen-free nutrients as sources of energy, and requires only a small amount of protein for repair. Experiments were undertaken to determine which organs contribute to the protein losses. An important consideration in such studies would be the development of different functions in different degree. The subject, the author believes, can perhaps be best studied with the muscles. The subject of the experiments cited performed on an ergostat work equal to from 105,000 to 136,000 kgm. on a diet supplying a minimum amount of nitrogen. The nitrogen excretion was increased in the ratio of 1 : 1.29. Assuming that 20 per cent represents the relation of utilized nutrients to useful work, there would be in round numbers for each 100 kilogram-calories 41 mg. of nitrogen metabolized. In other words, nitrogen plays practically no part as a source of muscular energy.

It has been claimed that the life of red blood corpuscles is very brief and that this necessitates an intensive repair. Experiments which are cited indicate that this is not probable. At the present time there are no satisfactory methods for making accurate observations regarding the renewal of the blood and organs.

Concerning the physiological nitrogen minimum, K. THOMAS (*Arch. Anat. u. Physiol., Physiol. Abt., 1910, Sup., pp. 249–285; abs. in Chem. Zentbl., 1912, I, No. 2, p. 91*).—The author studied experimentally the conditions under which nitrogen metabolism can be reduced to the value represented by the "utilization quota" and the conditions under which this quantity can be replaced by nitrogen of food without increasing nitrogen metabolism, experiments being made with himself as a subject and also with dogs.

From the data obtained it appeared that the physiological nitrogen minimum is influenced by 3 factors, namely, the biological value of the food nitrogen, the formation of stored protein, and the amount of total energy metabolism of the body. If food nitrogen and body nitrogen replace each other quantitatively, if the formation of stored protein is hindered by the fractional feeding of protein, and if experimental conditions remain constant so that the energy requirements of the body do not change in a condition of nitrogen hunger and with a nitrogen supply which is sufficient for maintenance, then the physiological nitrogen minimum is equal to the "utilization quota."

Theories of protein metabolism together with some of their practical results, L. B. MENDEL (*Ergeb. Physiol., 11 (1911), pp. 418–525, dgms. 2*).—This important digest is preceded by a bibliography of the subject containing several hundred references. Besides introductory material the article discusses the theories of protein metabolism advanced by a number of investigators, the relation of digestion to protein metabolism, products of digestion, and problems of protein structure. Another section deals with types of protein cleavage and another with the value of protein in nutrition. Researches which have to do with the protein minimum are summarized, together with other investigations of the physiological value of different protein compounds and similar topics. Protein standards in the diet are discussed particularly on the basis of R. H. Chittenden's experiments (E. S. R., 20, p. 263). The final section deals with the practical applications of Chittenden's theories and takes up at length the work and criticisms of other investigators with reference especially to the low proteid theory.

A study of nitrogen metabolism in man, H. LABBÉ (*Jour. Physiol. et Path. Gén., 13 (1911), No. 2, pp. 197–211*).—The author, accustomed to living on a diet fairly low in protein, performed a 5-day test upon himself in order to determine the character of the nitrogen metabolism when exceptionally low quantities of protein were ingested. At the beginning of the experiments the nitrogen in the diet, expressed in terms of protein, was equal to about 1 gm. per kilogram of body weight, and was gradually reduced to 0.5 gm. Food materials and the excreta were analyzed.

The author concludes that with a normal subject in good health the nitrogen equilibrium as it existed before the experiments was reestablished at the end of the experiments, this result being obtained without variation of weight during a short experimental period and while the nitrogen ingested was gradually reduced to about the minimum of nitrogen consumption. Notes are given on the various products of nitrogen metabolism as they appear in the excreta.

Concerning metabolism in nitrogen hunger, G. KINBERG (*Skand. Arch. Physiol., 25 (1911), No. 4–5, pp. 291–314, figs. 5; abs. in Chem. Zentbl., 1911, II, No. 14, p. 1047*).—Nitrogen excretion under the experimental conditions sank during the nitrogen hunger period with increasing rapidity and reached a minimum of 5.17 gm. on the ninth day.

Treatment of uric acid diathesis, M. HINDHEDE (*Ber. Hindhedes Kontor Ernæringsundersög., 1 (1912), pp. 50, dgms. 9; Skand. Arch. Physiol., 26 (1912), No. 4–6, pp. 384–406, dgms. 3*).—The author reports experiments conducted on himself and 5 other subjects with different dietaries made up of food materials with varying contents of purin substances.

It was found that the urine from a diet made up largely of potatoes was but slightly acid and did not contain uric acid. The urine from a meat, graham bread, rye bread, or bolted flour bread diet, on the other hand, contained uric acid. The urine from the potato diet was able to dissolve at blood temperature many times its own content of uric acid (from 1½ to 3½ gm. in all daily), and urine of a similar property was obtained when strawberries or milk, or both, were added to the fare. Milk diet produced an acid urine which could dissolve about 2 gm. of uric acid daily, at blood temperature, beyond that already contained therein. Tomatoes and apples showed similar results.

These and other data reported are discussed at length.

The influence of carbohydrates and fats on protein metabolism, E. P. CATHCART (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 231–235*).—The author presents data in support of his hypothesis that carbohydrates or products arising from the breakdown of carbohydrates are absolutely essential for endocellular synthetic processes in connection with protein metabolism.

The relation of nitrogen to sulphur in metabolism, O. GROSS (*Ztschr. Expt. Path. u. Ther., 9 (1911), No. 1, pp. 171–189, dgms. 10; abs. in Chem. Abs., 6 (1912), No. 3, p. 382*).—The ratio of nitrogen to sulphur in the excreta under normal conditions follows that in the intake. In starvation the sulphur in the output remains fairly constant to the nitrogen decrease. This would indicate that proteins rich in sulphur, or cleavage products, are first utilized during starvation. The lecithin fed apparently did not spare protein.

Phosphoric acid metabolism, R. BERG (*Chem. Ztg., 34 (1910), No. 118, p. 1049; abs. in Chem. Abs., 6 (1912), No. 2, pp. 243, 244*).—Such inorganic anions as H_2PO_4, H_2SO_4, etc., act simply as irritants in the human body and their neutralization accompanying their removal robs it of cations, especially calcium. The calcium phosphates are mainly removed in the form of $Ca_3(PO_4)_2$. Officinal dicalcium phosphate removes calcium instead of supplying it. Two-thirds of the calcium of calcium hypophosphite is retained in the organism and tends to cause an acidosis possibly dangerous in rachitis and other pathological conditions. It is valueless for supplying phosphorus. Either calcium sulphate or calcium chlorid may be used to increase urine secretion or peristalsis, but they leave part of their calcium in the organism and rob it of sodium or potassium. Calcium carbonate must be converted into calcium chlorid by the gastric juice in order to be effective. Acid carbonate appears to be in a measure absorbed. Lecithin and also phytin are decomposed in digestion. Inorganic "nutrient salts" have value as irritants, but are useless as building materials.

Experiments on the nutritive value of phosphorus compounds, W. HEUBNER ET AL. (*München. Med. Wchnschr., 58 (1911), No. 48, pp. 2543, 2544*).—In experiments with animals no marked differences in phosphorus gain were noted when phosphates and lecithin were fed in comparison. It is proposed to study further the distribution of phosphorus in the organs and whether there is a difference in the character of the stored phosphorus.

Lecithin metabolism, A. BICKEL (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 3 (1911), No. 2, pp. 171–179; abs. in Chem. Abs., 6 (1912), No. 2, p. 242*).—The nitrogen and phosphorus balance was determined in the case of a man fed with common lecithin preparations, such as

biocitin and ovolecithin. The lecithin phosphorus appeared to be resorbed and deposited.

Influence of lecithin upon calcium and magnesium excretion, A. LOEB (*Internat. Beitr. Path. u. Ther. Ernährungsstör. Stoffw. u. Verdauungskrank., 3 (1911), No. 2, pp. 235–237; abs. in Chem. Abs., 6 (1912), No. 2, p. 242*).—In experiments with a man fed lecithin the phosphoric acid appeared to be retained, but this was not the case with the calcium and magnesium. Inorganic bone substance was not increased.

Experimental investigations concerning the significance of lipoids in nutrition, W. STEPP (*Ztschr. Biol., 57 (1911), No. 5, pp. 135–170*).—Confirming earlier work,[a] the author found that white mice could not be kept alive on a diet of rice and milk subjected to thorough extraction by alcohol and ether, and that the addition of salts to such a diet produced no improvement. However, when the evaporated extract was added, and particularly extract from substances containing an abundance of material soluble in ether and alcohol, the mice throve.

The addition of butter, tripalmatin, tristearin or triolein, lecithin or chloresterol to the extracted food did not sustain life, but with the addition of an alcoholic extract of 200 cc. of dried skim milk to each 100 gm. of extracted food the mice were in normal condition at the end of 6 weeks.

Boiling the milk had an effect not clearly explained. In half the tests the addition of the extract from boiled milk did not sustain life.

While the author realizes the complexity of the whole subject, his experiments lead him to conclude that regarding the substances in question only this much may be said, that since they are soluble in alcohol and ether and are not fats, they fall under the head of lipoids. For the physiology of digestion the experiments are significant in so far as they indicate clearly that it is not enough to judge a diet purely by its caloric value.

The metabolism of the hypophysectomized dog, F. G. BENEDICT and J. HOMANS (*Jour. Med. Research, 25 (1912), No. 3, pp. 409–502, pl. 1, dgms. 8*).—In general, when the hypophysis was removed a general tendency to retard the normal growth of the animal was observed and gain in weight was principally due to the deposition of fat. There was a tendency to slightly lowered body temperature, as well as a marked fall in pulse rate which occurred a few days after operation and then continued, and a fall in the respiration rate approximately parallel and similar to that of the pulse rate. The total metabolism as measured by the carbon dioxid production was decidedly lowered.

The small respiration apparatus used in the experiments is described.

The influence of moderate changes of temperature of the surrounding atmosphere on the respiratory exchange of infants, A. SCHLOSSMANN and H. MURSCHHAUSER (*Biochem. Ztschr., 37 (1911), No. 1–2, pp. 1–22, dgms. 12; abs. in Jour. Chem. Soc. [London], 102 (1912), No. 591, II, p. 57*).—It was found that moderate changes of temperature exercised practically no influence on the respiratory exchange.

The influence of crying on the respiratory exchange of infants, A. SCHLOSSMANN and H. MURSCHHAUSER (*Biochem. Ztschr., 37 (1911), No. 1–2, pp. 23–29, dgms. 2; abs. in Jour. Chem. Soc. [London], 102 (1912), No. 591, II, p. 57*).—When the respiratory exchange of infants was studied by means of a calorimeter during periods of rest and crying, it was found that crying increased the consumption of oxygen 44 per cent and the carbon dioxid excretion 59.4 per cent.

The secretion, salt content, and reaction of sweat, C. KITTSTEINER (*Arch. Hyg., 73 (1911), No. 3–4, pp. 275–306, dgms. 3*).—The author and other persons

[a] Biochem. Ztschr., 22 (1909), p. 452.

in normal health were subjects, perspiration being collected from the face, the arm, and the lower leg by means of glass tubes fastened to the body with rubber tissue.

The face apparently secreted sweat most abundantly. The amount of sodium chlorid contained in sweat was directly proportional to the rate of secretion. Temperature, humidity, muscular activity, baths, psychic influences, and other conditions exercised only an indirect influence on the salt content, but a perceptible increase in the amount of salt taken in food produced a corresponding increase in the salt excretion in perspiration.

Under ordinary conditions sweat is acid in reaction, the acidity increasing when the secretion is heated. In general, the arm yielded the most acid perspiration and the lower leg the least acid of the samples studied. Muscular activity, baths, and other means of increasing perspiration have no direct influence upon acidity.

ANIMAL PRODUCTION.

The interpretation of the results of feeding experiments, T. B. Wood (*Jour. Bd. Agr. [London], Sup. 7, 1911, Nov., pp. 32–37*).—A method of determining the probable error of feeding trials is discussed, and examples of its use in interpreting the results are cited. See also a previous note (E. S. R., 24, p. 633).

The results of 2 feeding trials with sheep, in which concentrated cakes were compared, were inconclusive. Combining the results of 3 trials, which included 38 animals for each food, it was found that a mixture of decorticated cake and barley gave 9.1 per cent greater increase in live weight than linseed cake. The probable error on this increase was 3.1 per cent. The difference was 2.9 times the probable error, which corresponds to odds of 20:1. Therefore, the author states that the conclusion that a mixture of decorticated cake and barley is a better food for sheep than linseed cake is justified.

The theoretical foundations of the principles of feeding. Kleberger (*Fühling's Landw. Ztg., 61 (1912), No. 1, pp. 19–26*).—A brief historical résumé of the progress made in experimental studies of the nutritive value of feeding stuffs, with special reference to the work of Kellner.

The beet sugar industry and live stock production, W. L. Petrikin (*Denver [1911], pp. 14*).—Attention is called to the advantages of utilizing waste products of sugar beets for feeding domesticated animals. Samples of rations containing beet pulp are given.

Feeding experiments with cattle and sheep, 1910–11, D. A. Gilchrist (*County Northumb. Ed. Com. Bul. 17, 1912, pp. 17*).—When young cattle were fed a larger proportion of protein than called for by the Wolff-Lehmann standard somewhat faster gains were made but at less profit. Decorticated cotton cake as a concentrate caused slightly faster gains than soy-bean cake, but in one experiment was less economical. In a feeding test with sheep, when maize meal and straw were substituted for swedes, the gains were more rapid but the cost of gain was increased. Analyses of meadow hay, straw, swedes, soy cake, decorticated cotton cake, and Bombay cotton cake are given.

On the spontaneous heating of hay, H. Miehe (*Arb. Deut. Landw. Gesell., 1911, No. 196, pp. 36, figs. 3; abs. in Jour. Bd. Agr. [London], 18 (1912), No. 11, pp. 944, 945*).—Up to 40° C. heating the hay stacks was found to be due chiefly to *Bacillus coli*, but if the grass was not quite dead the first stage was caused mainly by respiratory activity. From 40 to 75° *B. calfactor* was mainly responsible; above 75° the heating was purely chemical. *Oïdium lactis* and *Aspergillus niger* were also found to assist in the production of heat.

[Analyses of feeding stuffs], R. E. Rose and E. P. Greene (*Fla. Quart. Bul. Dept. Agr., 22 (1912), No. 1, pp. 72–94*).—Analyses are reported of wheat,

wheat middlings, cotton-seed meal, bran, east-coast grass, ground clover, ship stuff, gluten feed, rice flour, dried beet pulp, alfalfa meal, and proprietary feeds.

Inspection and analyses of commercial feeding stuffs, 1910–11, W. F. HAND ET AL. (*Mississippi Sta. Buls. 149, pp. 3–37; 152, pp. 3–31*).—Analyses are reported of 280 samples of rice bran, wheat bran, wheat shorts, wheat middlings, rice polish, ship stuff, corn chops, and mixed feeds.

Chicago farmers' and drovers' journal: Yearbook of figures, 1912 (*Chicago, 1912, pp. 116*).—A brief statistical résumé of the live stock movements in the United States for 1911, including tables of prices, receipts of live stock, and data on the principal feeding stuffs.

Britain's sources of meats (*Breeder's Gaz., 61 (1912), No. 5, pp. 250, 251*).—Statistics are presented showing the decline in the exports of live cattle and sheep and dressed beef from the United States and Canada to Great Britain during the past 7 years, and the increase in the exportation of dressed beef from Argentina.

The live stock trade, C. A. PENNING (*Jaarb. Dept. Landb. Nederland. Indië, 1910, pp. 269–286, pl. 1*).—This contains statistics on the live stock industry in the Dutch East Indies.

Cattle breeding, F. B. LÖHNIS (*Verslag. en Meded. Dir. Landb. Dept. Landb., Nijv. en Handel, 1911, No. 6, pp. 104*).—A general and statistical article on cattle breeding, breeders' associations, and related matters.

Annual report of the general manager, Naivasha stock farm, for 1910–11, N. A. MCGREGOR (*Dept. Agr. Brit. East Africa Ann. Rpt. 1910–11, pp. 119–132*).—This contains notes on the adaptability of imported breeds of domesticated animals and their crosses under East African conditions.

The period of rutting in cattle, swine, and horses, J. STRUVE (*Fühling's Landw. Ztg., 60 (1911), No. 24, pp. 833–838*).—This contains data on the frequency and duration of the rutting period. The figures given for the average length from the beginning of one to the occurrence of the next period is 20.158 days for cows and 20.66 for swine. The exact time was found to be more difficult to determine in the case of horses, but is thought to be about the same.

The cattle in the region of the central Pyrenees, J. GIRARD (*Rev. Vét. [Toulouse], 37 (1912), Nos. 1, pp. 7–14; 2, pp. 75–86; 3, pp. 134–146, figs. 4*).—A description is given of the origin and characteristics of the cattle in the highlands and vales of southwestern France. All are of the same general type but they are known by many different names.

A new form of a small diluvial primitive ox (Bos urus minutus n. sp.), K. VON DEN MALSBURG (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. B, 1911, No. 5, pp. 340–348, pls. 3; abs. in Arch. Rassen u. Gesell. Biol., 8 (1911), No. 6, p. 802*).—A description is given of 3 imperfect bovine skulls obtained from diluvial strata, which closely resemble *B. primigenius* except in size. The author thinks they represent an intermediate form brought about by unfavorable conditions.

Contributions to the physiology of the nutrition of growing animals.—III, The protein requirements of growing cattle, G. FINGERLING (*Landw. Vers. Stat., 76 (1912), No. 1–2, pp. 1–74*).—From a series of metabolism experiments with 4 calves on different rations the author concludes that 1.5 kg. of digestible protein per 1,000 kg. live weight per day gives as satisfactory results for calves from 5 to 9 months of age as a larger proportion of protein, provided there are sufficient carbohydrates in the ration.

Notes on the primitive breeds of sheep in Scotland, H. J. ELWES (*Scot. Nat., 1912, Nos. 1, pp. 1–7; 2, pp. 25–32; 3, pp. 49–52, pls. 3*).—A discussion of the origin and characteristics of the native breeds of sheep in the islands of

Shetland, Orkney, Soay, Hebrides, and Man, and of the Keerie or Rocky sheep of Caithness.

Horns in sheep as a typical sex-limited character, T. R. ARKELL and C. B. DAVENPORT (*Science, n. ser., 35 (1912), No. 897, pp. 375–377*).—Matings of the sheep used and their hypothetical somatic and gametic composition are presented in tabular form, and it is stated that the results agree with the theory that the male is heterozygous in sex and that there is an inhibitor of horn formation which is located in the sex chromosomes.

Sheep farming in America, J. E. WING (*Chicago, 1912, 3. ed., rev. and enl., pp. 368, pl. 1, figs. 68*).—A revised edition of this work (E. S. R., 19, p. 1068).

The sheep industry in Canada, Great Britain, and United States, W. A. DRYDEN and W. T. RITCH (*Canada Dept. Agr., Branch Live Stock Comr., Spec. Rpt., 1911, Nov., pp. 187, pls. 57*).—This contains data and methods of breeding and feeding sheep in the different sections of Canada, United States, and Great Britain. There are also statistics of the world's sheep and wool industry, and recommendations for improving the sheep industry in Canada.

Sheep breeding in New Zealand, J. LINTON (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 6, pp. 484–486*).—This contains data obtained from flock books of each breed of sheep in New Zealand.

Energy required for the work of digestion in sheep, W. USTJANZEW (*Biochem. Ztschr., 37 (1911), No. 5–6, pp. 457–476*).—The determination of income and outgo of energy was made by the respiration calorimeter.

The average energy required per minute per kilogram of live weight with sheep was 12.86 calories for mastication, 3.92 calories for rumination, 21.6 calories for digestion in one experiment, and 22.89 calories in another test containing a large amount of fiber. In all cases the rations containing a large amount of hard fiber required more energy for mastication, rumination, and digestion than rations containing a small amount of fiber.

The value of fiber testing machines for measuring the strength and elasticity of wool, J. A. HILL (*Wyoming Sta. Bul. 92, pp. 3–23, fig. 1*).—A discussion of work previously noted (E. S. R., 26, p. 570), with special reference to the usefulness of the fiber-testing machine for measuring strength and elasticity of the wool fiber. It is concluded that the great variability of the wool fiber with respect to these 2 characters renders the most perfect fiber-testing machine valueless as an instrument to be used for commercial and industrial purposes as far as wool is concerned.

The remains of swine from Friesian mounds, L. BROEKEMA (*Cultura, 24 (1912), No. 282, pp. 71–77*).—Measurements of subfossil bones of swine obtained from mounds in Friesia are presented in tabular form and compared with those found in other places. There is also a discussion of the ancestry of European swine.

Feeding experiments with swine, K. HOFMANN and J. HANSEN (*Landw. Jahrb., 40 (1911), Ergänzungsb. 1, pp. 190–210*).—This is a continuation of earlier work (E. S. R., 21, p. 173). Steamed potatoes and potato flakes were of about equal feeding value, but the flakes produced a better quality of pork. Better gains were made with barley than with rye. Meat meal produced excellent gains, but was considered too expensive for economical gains.

Feed requirement of brood sows, F. LEHMANN (*Jour. Landw., 59 (1911), No. 3, pp. 317–363, pl. 1*).—A high protein ration increased the birth rate of the young and faster gains were made after birth than where sows remained on a ration low in protein.

Feeding experiments with swine, O. KELLNER, F. LEHMANN and J. KÖNIG (*Ber. Landw. Reichsamte Innern 1909, No. 15, pp. 71*).—A report of a number of miscellaneous feeding tests made at 3 different stations. The feeds tested

included Russian feeding barley, German brewing barley, barley bran, rye meal, rye bran, wheat bran, fish meal, meat meal, potatoes, dried potatoes, sugar beets, sugar chips, milk, skim milk, red clover, lucern, vetch, beet-leaf silage, oats, field beans, dried distillery slops, dried brewers' grains, wheat straw, maize, cotton-seed meal, sesame cake, and coconut cake. Analyses of the feeds are given.

The basis of swine fattening, F. LEHMANN (*Molk. Ztg. [Hildesheim], 25 (1911), Nos. 97, pp. 1823, 1824; 98, pp. 1843, 1844; 99, pp. 1857, 1858*).—This is chiefly a discussion of the feed requirements of swine.

Eugenics and the breeding of light horses, J. C. EWART (*Field [London], 119 (1912), Nos. 3085, pp. 288, 289; 3086, p. 346, figs. 12*).—Attention is called to the need for improving light horses for army remounts, which can be done only by conducting breeding operations on scientific principles. If pure breeding strains are to be obtained, pure-breeding females as well as pure-breeding males must be used as foundation stock.

"To breed economically light horses suitable for military purposes it will be necessary to form at least one pure-breeding (homozygous) strain of thoroughbreds of the hunter type, and at least one pure-breeding strain with, say, the characteristics of the old Irish draft horse or of the old English pack horse. If, as is highly probable, a homozygous thoroughbred hunter strain yields with a pure-breeding draft horse strain hybrids or crosses relatively as uniform and valuable as the hybrid red-roan Shorthorns, the problem of breeding light horses for military and general utility purposes would be solved. . . . Though homozygous strains or lines of thoroughbreds have not yet been formed, there actually exists now . . . a number of thoroughbreds (of what may be known as the chaser or Red Prince type) which invariably breed true. By forming a stud made up of, say, a score of pure-breeding mares and of 3 or 4 pure-breeding stallions which invariably produce offspring of the Red Prince type, the foundation would be laid of an invaluable thoroughbred strain."

What horse for the cavalry? S. BORDEN (*Fall River, Mass., 1912, pp. V+106, pl. 1, figs. 57*).—Types of horses bred in Holland, Germany, Austria, and Hungary that are suitable for remounts are illustrated and described.

Horse breeding in Italy, H. VON ALBERT (*Deut. Landw. Presse, 39 (1912), No. 19, p. 222, figs. 2*).—This contains brief descriptions of the more common breeds of horses in Italy.

Some experiments with poultry, C. L. OPPERMAN and R. H. WAITE (*Maryland Sta. Bul. 157, pp. 79–95, figs. 4*).—In a study of the egg production of 60 white Leghorn hens in 3 successive years, the average number of eggs per bird was 171.3 the first year, 149.1 the second year, and 151.1 the third year. The estimated cost of the maintenance of the flock was $90 for each year. The profit per hen was $2.07 the first year, $1.61 the second year, and 90 cts. the third year. The yearly individual records obtained by trap nests are given. All of the 5 hens which produced 200 eggs and over laid their first egg in November, whereas of the fowls producing 100 and under only 3.7 per cent laid their first egg in November, 44.4 per cent laid the first egg in January, and 13 per cent laid the first egg in February. One fowl made the best record in the third year, 13 the second year, and the remainder during the first year.

"The percentage of shrink in egg production during the third year proves conclusively that birds of this age are being maintained at a serious financial loss."

The adoption of some method for marking fowls is advocated as a means for increasing egg production.

A study as to the time required for eggs to become fertile led to the following results: "On the fourth day after the male was added in the first test

with Leghorns 10 eggs were laid by the 20 birds, of which 7 were fertile. Fifty per cent of the eggs laid on the third day (less than 54 hours after the male had been put in) were fertile. In the next test, using the same birds, 13 eggs were laid on the fourth day, of which 10 were fertile. In the next test, using 18 Rhode Island Red pullets and 1 White Plymouth Rock cockerel, 4 eggs were laid on the seventh day and all were fertile, 6 were laid on the eighth day, 3 being fertile. In the next test, using another pen of the same breeds, 8 eggs were laid on the eighth day, all being fertile. In the next test, using still another pen of the same breeds, 5 eggs were laid on the eighth day, 4 of which were fertile. The next day, however, 4 infertile eggs were laid and from then on the fertility was not as high as in the other tests. . . . In the case of the pen of 20 Leghorns an egg was found to be fertile that was laid after the male had been removed 20 days. In this pen the fertility held up well for 11 days. The fertility of the eggs from the Plymouth Rock pen held up well until after the tenth day. One egg was found to be fertile which was laid 16 days after the male had been removed."

From a study of the effect of feeding corn on the color of the yolk of eggs the following conclusions were drawn: "Yellow corn, when fed to hens in the proportion of 9 parts corn to 12 parts mash, gives a very deep yellow color to the yolk of the resulting eggs. Yellow corn, when fed to hens in the proportion of 4½ parts corn to 16½ parts of other feeds, gives a noticeably yellow tint to the resulting eggs. Wheat, when fed in the same proportions as above, does not give any yellow color to the eggs. White corn is no better than wheat so far as furnishing a tint to the yolk of the resulting eggs is concerned.'

A cooperative investigation on the profitableness of poultry when kept under farm conditions, W. A. Lloyd and W. L. Elser (*Ohio Sta. Circ. 118, pp. 69–90, figs. 7*).—A cooperative investigation on the cost of keeping poultry under the usual conditions for a period of 1 year. No advice was given to the cooperators as to the feeding and care of the flocks. About one-half of the flocks were of mixed breeds, but there were pure-bred flocks of Barred Rocks, Rhode Island Reds, Brown Leghorns, and other breeds.

The average figures given for 18 flocks kept on farms were as follows: Number of fowls 121, eggs per hen 71, labor cost per fowl 28 cts., feed cost per fowl 61 cts., total value of eggs sold $121.14, value of poultry sold $45.67, value of eggs used $18.41, value of poultry used $13.76, and profit per fowl 87 cts. The corresponding figures for 12 town flocks were: Number of fowls 46, eggs per hen 70, labor cost per fowl 60 cts., feed cost per fowl 97 cts., total value of eggs sold $41.36, value of poultry sold $29.28, value of eggs used $16.77, value of poultry used $9.95, profit per fowl 36 cts.

The largest number of fowls kept in the town flocks was 97, and the fewest 18. Four of the town flocks showed a loss, the greatest averaging a loss of 93 cts. per fowl. The greatest profit of the town flocks was from a flock of 26, averaging a profit of $1.64 per fowl. The profit on the farm flocks ranged from 14.5 cts., from a flock of 149 fowls, to $2.47, from a flock of 96 fowls. None of the farm flocks showed a loss. Three flocks exceeded 300 fowls, from which the average profit was 86 cts. per fowl. The average cost of equipment of the 18 farm flocks was $65.61, of the 12 town flocks $88.54, and of 1 commercial poultryman $401.50.

The following figures are given relative to the cost of poultry used in families: The average per individual in town was 229 eggs, valued at $4.19, and 5 fowls valued at $2.48. The figures per individual in the country were 264 eggs, valued at $4.60, and 7 fowls at a value of $3.44.

Other conclusions reached are: "Both in town and country small flocks have given greater profits per fowl than large flocks. Flocks with unlimited range

have shown better profits than flocks that were partly or wholly confined. Farm flocks have been more profitable than village or city lot flocks. . . . Poultry 'systems' requiring close confinement of the flock and a large amount of personal attention are out of place on a general farm. The poultry should be incidental to the main business of the farm. Farm and village lot poultrymen are serious competitors with the commercial poultrymen. The surplus from all these small flocks pours upon the market a continuous stream regardless of profit. . . . A better system of marketing eggs and poultry is needed; one which will encourage the production of a high-class product and insure expeditious and careful transportation to the consumer."

[Hatching chickens on a large scale] (*N. Y. Produce Rev. and Amer. Cream., 33 (1912), No. 17, pp. 724, 725*).—A note on a hatchery with a capacity of 30,000 eggs at one time.

"The principle of the hatchery is the use of a fan to drive the heat from gas burners downward through the eggs, instead of allowing it to rise to the higher elevations as hot air will always do if left to itself. The fan principle enables the placing of the eggs in the hatchery 20 layers deep, instead of 1 or 2, as in the small incubators. Therefore, one man can attend to the hatching of the entire contents of the hatchery, as thermostats and other scientific attachments positively control the heat in the incubator to 100.5°, which is the exact heat for hatching eggs. In case a stronger or lesser flow of gas in the heater is required, the thermostat controls it automatically."

The method of turning eggs by the incubating hen, J. L. Frateur (*Rev. Gén. Agron., n. ser., 6 (1911), No. 11–12, pp. 472–477*).—By numbering the eggs the exact location of each egg was determined from day to day during the incubation period. It was found that the position was changed daily, the eggs occupying the center of the nest being moved to the periphery and vice versa by rotating on the longer axis.

The formation of organic phosphorus from inorganic phosphates, G. Fingerling (*Biochem. Ztschr., 38 (1912), No. 5–6, pp. 448–467*).—Analyses of eggs laid by geese showed that lecithin and nuclein were synthetically formed from inorganic phosphorus supplied in the ration.

Effect of narcotics upon the development of hen's egg, A. M. Reese (*Abs. in Science, n. ser., 35 (1912), No. 892, p. 191*).—An abstract of a preliminary account of the effect of reagents on the development of the hen's egg. Alcohol was fatal in about 75 per cent of the experiments, ether in about 35 per cent, and chloroform, chlorotone, and magnesium chlorid were generally fatal, though with the 2 latter compounds some deaths may have been due to faulty technic.

White-faced black Spanish, R. A. Rowan (*Rel. Poultry Jour., 19 (1912), No. 1, p. 75, fig. 1*).—Brief notes on the revival of interest in what is supposed to be the oldest breed of the Mediterranean type of fowls.

What's a capon and why, G. Beuoy (*1912, pp. 40, pl. 1, figs. 35*).—The advantages of caponizing are discussed, and methods for performing the operation are described.

Ostrich breeding, W. Bassermann (*Der Strauss und seine Zucht. Berlin, 1911, pp. VIII+157, pls. 15*).—A general treatise on the breeding, feeding, and management of ostriches.

The fur trade, E. Brass (*Aus dem Reiche der Pelze. Berlin, 1911, pp. XXI+709, figs. 183*).—The first part of this book is devoted to the history of the trade in fur, skins, and hides of animals. The second is devoted to the natural history of fur-bearing animals, both wild and domesticated.

History and criticism of inbreeding, Strang (*Deut. Landw. Tierzucht, 15 (1911), Nos. 49, pp. 585–587; 50, pp. 597–601; 51, pp. 612–616; 52, pp. 622–624*).—

A review of the literature on this topic, with suggestions as to when inbreeding can be practiced with safety.

A literary note on Mendel's law, W. W. Stockberger (*Amer. Nat., 46 (1912), No. 543, pp. 151–157*).—This is a synoptic statement of the fundamental principles of Mendel's work, with many bibliographical notes.

Tables of statistical error, R. Ross and W. Stott (*Ann. Trop. Med. and Par., 5 (1911), No. 3, pp. 347–369*).—This contains tables specially constructed for practical work in biology, eugenics, pathology, and sanitary science. Examples are given showing how to find the percentage of statistical error in proportionately small samples, proportionately large samples, and in things of one class.

The law of vast numbers (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 303–307*).—An editorial containing suggestions for a method of procedure in breeding experiments. Reference is made to circuit breeding methods in Minnesota and North Dakota, wherein a selection of breeding animals can be made from a much larger number than is possible among individual breeders.

The determination of sex and Mendel's law, F. E. Peck (*Hoard's Dairyman, 43 (1912), No. 8, p. 309, fig. 1*).—Mendel's law as applied to sex determination is discussed and illustrated by diagram.

New arguments in favor of the action of the suprarenal glands in the determination of sex, R. Robinson (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 21, pp. 1026, 1027*).—From chemical observations the author thinks that pathological conditions of the suprarenal capsules in females interfere with the normal functioning of the ovaries, and that sex is closely associated with the activity of these glands.

The problem of sex determination in Dinophilus gyrociliatus.—I, The sexual cycle, C. Shearer (*Quart. Jour. Micros. Sci. [London], n. ser., 57 (1912), No. 227, pp. 329–371, pls. 5, figs. 5*).—A study of the factors in sex determination in fertilized and in parthenogenetic eggs. The details of fertilization and oögenesis are given, and it is concluded that the presence of large eggs, which invariably give rise to females, seems to be due to fertilization, the unfertilized eggs being smaller and giving origin to the males.

Sex determination in daphnids, R. Woltereck (*Internat. Rev. Gesam. Hydrobiol. u. Hydrog., 4 (1911), No. 1–2, pp. 91–128, figs. 6; abs. in Jour. Roy. Micros. Soc. 1911, No. 6, pp. 757, 758*).—In continuation of earlier work (E. S. R., 25, p. 171) the author concludes that external conditions may sometimes have a distinct influence on the sex of the developed ovarian ova, as well as on the ova to be subsequently formed. The view is expressed that in the ovum are competing sex substances, one of which becomes active as the egg matures, while the other remains latent. This inhibition may occur at 2 different periods, one shortly before the ovum leaves the ovary, and the other much earlier, as in the undifferentiated germ layer of the ovary, in the gonad primordium of the winter egg, or in the ripening female egg. External influences act only when the internal conditions of maturation and activation are approximately the same for the 2 sex substances.

"If we adopt the author's suggestion of applying the ideas of the ferment and antigen theory to these substances and processes, we can suppose that the alternating appearance and suppression of inhibiting substances ('paralysators'), or of activating substances ('activators'), are the real causes of the periodicity of sex determination. The sex substances themselves may be considered as somewhat like pro-ferments (if latent), and ferments (if activated)."

The determination of sex in the human species, Mrs. D. McConnel (*Cal. State Jour. Med., 9 (1911), No. 9, pp. 370–372*).—Experience and observations

with cattle, fowls, and the human species are cited in support of the theory that sex is dependent upon the condition of the ovum at the time of fertilization.

On the determination of the secondary sexual characters in Gallinaceæ, A. PÉZARD (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 21, pp. 1027–1029, figs. 2*).—The author reports changes in plumage and other characteristics induced by castration of Orpington fowls and golden and silver pheasants.

DAIRY FARMING—DAIRYING.

Balanced rations for dairy stock, J. B. LINDSEY (*Massachusetts Sta. Circ. 30, pp. 7*).—This information has been prepared, in cooperation with the State Board of Agriculture, to furnish information to practical dairymen on the composition and digestibility of cattle feeds, combining coarse and concentrated feeds, and types of balanced rations for milch cows and young stock.

The influence of calving time, length of dry period, and age upon milk production, SPANN (*Deut. Landw. Tierzucht, 16 (1912), No. 2, pp. 16–18*).—The average yearly milk production of 3,000 cows of the Algau breed was 3,130 kg., containing 3.643 per cent of fat. Those cows calving from November to December, inclusive, averaged 3,193 kg. of milk per year, while those calving at other seasons averaged 3,031 kg. per year. The fat content decreased as the cows grew older, and a high percentage of fat was not correlated with a low yield of milk. Other results are shown in the following table:

Correlation between length of dry period and of successive lactation periods and the yield of milk.

Number of cows.	Length of dry period.	Yield of milk.	Number of cows.	Number of lactation period.	Yield of milk.
	Days.	*Kg.*			*Kg.*
44	1– 10	3,026	628	First	2,697
60	11– 20	3,143	600	Second	2,951
138	21– 30	3,181	551	Third	3,252
165	31– 40	3,269	455	Fourth	3,339
188	41– 50	3,390	322	Fifth	3,468
193	51– 60	3,450	215	Sixth	3,443
206	61– 70	3,375	219	Seventh or more	3,156
183	70– 80	3,281			
131	80– 90	3,197			
102	90–100	3,189			
176	100	2,874			

[Milk yields of cows in Trinidad], H. S. SHREWSBURY (*Dept. Agr. Trinidad and Tobago Bul., 10 (1911), No. 69, pp. 220–224*).—Milk yields are reported of pure-bred Holsteins and Guernseys, and grade zebus, Red Polls, Guernseys, and Shorthorns.

Valuation of milk, E. PETERSSON (*Molk. Ztg. Berlin, 22 (1912), Nos. 5, pp. 51, 52; 6, pp. 62–64*).—The various tests for judging milk are described, and also some methods of paying for milk according to its quality as shown by these tests. These include the fat content, dirt, bacterial counts, and other properties that may affect its value.

Accounts for a dairy farm, C. S. PHELPS (*Country Gent., 76 (1911), No. 3070, p. 6*).—A method of keeping records and distributing the cost of production on a dairy farm.

Contribution to the anatomy and physiology of the mammary glands of cattle, S. G. ZWART (*Beiträge zur Anatomie und Physiologie der Milchdrüse des Rindes. Inaug. Diss., Univ. Bern, 1911, pp. 95, pl. 1*).—By inserting a U-shaped tube into the teat the pressure of milk within the mammary gland was determined.

The length of time after milking, the amount of milk in the udder, and the position of the animal were factors which affected more or less the amount of pressure, which was not much greater than the atmospheric pressure at any time. More pressure was in the hind than in the fore quarters. The anatomy and physiology of milk secretion are described.

[Papers on the chemistry of milk] (*Science, n. ser., 35 (1912), No. 897, pp. 388, 392, 393*).—These are abstracts of papers read before the section on biological chemistry at the Washington meeting of the American Chemical Society, December, 1911.

Gases of Swiss cheese, II, W. M. Clark (p. 388).—It was found that the gas of normal "eyes" consists largely of CO_2 and nitrogen. Hydrogen is sometimes present in very small percentages. The gas produced by normally developing cheese during the period of its maximum "eye" formation is chiefly carbon dioxid, but the normal production of gas, which takes place frequently the first day, is accompanied by large percentages of nitrogen. The absorption of oxygen was studied, as well as the permeability of cheese to different gases. The interchange of gases and the relation of these to theories concerning the formation of the eyes is discussed.

The cholesterol content of milk under normal and pathological conditions, L. W. Fetzer (p. 388).—Under pathological conditions there was a decrease in the cholesterol content of milk and a corresponding decrease in the fat content but when the cholesterol content was compared with the milk fat on the basis of 100 parts of ether extract the cholesterol seemed to be increased.

A study of the decomposition products of milk caused by Bacillus lactis erythrogenes, M. Louise Foster (p. 392).—Sterile milk inoculated with *B. lactis erythrogenes* gave a faintly red solution after standing a few days at room temperature. On long standing it became blood red on the coagulation of the milk. In from 2 to 6 months the red liquid became viscous, then fluid again, with the formation of a white granular precipitate. The reaction was alkaline and it gave the biochemical tests, which showed that the organism had attacked the protein molecule as well as the carbohydrate. From 5 to 8.6 per cent of the total native protein remained unattacked, while the remainder was identified as proteoses and monoamino acids. An enzym was isolated in the usual way, which was found to coagulate milk, giving a supernatant liquid acid to litmus. This acidity was found to be due to the presence of acetic and formic acids. No lactic acid was found.

The influence of phosphorus compounds on the yield and composition of goat's milk, A. R. Rose and J. T. Cusick (p. 393).—There was an increase of fat and a decrease in milk volume when the phosphorus content of rations for milch cows was increased, and vice versa. The other constituents of the milk were not affected. These results do not agree with those obtained with goats by Fingerling.

Studies on the flavor of the green mold cheeses, J. N. Currie (p. 394).—Fat was found to undergo a marked hydrolysis during the ripening of Roquefort, Gorgonzola, and Stilton cheese. This is doubtless due to a lipolytic enzym. The characteristic peppery taste of the green mold is at least partially to be ascribed to an accumulation of caproic, caprylic, and capric acids, or their readily hydrolyzable ammonium salts.

Composition of Australian milk, E. H. Miller (*Analyst, 37 (1912), No. 431, pp. 47–50*).—The average composition of 11,140 samples of milk gave the following results: Morning milk, specific gravity 1.0304, total solids 12.62 per cent, fat 4.07 per cent; evening milk, specific gravity 1.0310, total solids 12.96 per cent, fat 4.23 per cent; mean, specific gravity 1.0307, total solids 12.79 per cent, fat 4.15 per cent. The poorest milk occurred in the month of January, which

approximates the month of June in the northern hemisphere. The lowness of the specific gravity for the months of December, January, and February is ascribed to a flush of green herbage, which was caused by copious rains.

The aldehyde figure of a number of samples was found to average 18.5°, using tenth-normal strontia, and 17° using tenth-normal soda, which corresponds with the results of Richmond and Miller. The protein-aldehyde ratio, using strontia, was 0.173.

Analyses are also reported of a sterilized milk of German origin imported into Java, 5 samples of sweetened condensed milk purchased in Victoria, and 6 samples purchased in New South Wales. Tyrosin was detected in all except 2 samples of the condensed milk.

Physiology of Bacterium lactis acidi, S. Korolev (*Viestnīk Bakt. Agron. Stantsii V. K. Ferreĭn, 1911, No. 18, pp. 49–79*).—The author repeated the experiments of Budinov (E. S. R., 22, p. 383), and obtained similar results. Physiological activity as determined by the time required for coagulation diminished less rapidly than cell division.

From the data obtained the author draws the following practical conclusions: Liquid cultures may safely be kept in winter for 2 to 3 weeks at temperatures close to zero, though with fluctuations. In the summer, up to temperatures at about 30° C., the virulence of the physiological activity of the organisms can be guarantied only for 3 or 4 days and in no case over a week, but at temperatures under 20° the cultures may be kept for a week and a half.

The chief phases in the souring of milk, and its practical significance, M. Grimm (*Centbl. Bakt. [etc.], 2. Abt., 32 (1911), No. 3–5, pp. 65–70*).—In the acidification of milk by means of pure cultures of *Bacterium lactis acidi* there were found to be 4 phases. The first phase, in which the organisms multiply rapidly, lasted 4½ hours after inoculation, but there was no perceptible increase in acidity. In the second period there was a very rapid rise in acidity, which lasted approximately until the sixteenth hour. From that time until about the thirty-second hour the acidity increased but at a much lower rate than in the second period. During the last period there was practically no increase in the acidity, though the bacteria multiplied to some extent.

The conclusion is drawn that for practical inoculations the pure culture should not be held in the thermostat more than 16 hours if the greatest activity of the organism is desired.

The influence of the products of lactic organisms upon Bacillus typhosus, Zae Northrup (*Michigan Sta. Tech. Bul. 9, pp. 33, figs. 2*).—This study of the viability of *B. typhosus* was undertaken to determine its maximum longevity in milk undergoing lactic fermentation.

In a preliminary test measured portions of lactic acid were added to a definite volume of sweet milk, but this was found to be unsatisfactory as the curd produced is quite dissimilar to that produced by lactic organisms, other products of lactic fermentation were absent, and a certain amount of the pure lactic acid was combined with the casein, leaving only a portion of the total acid free to act upon the organism. A litmus lactose agar containing calcium carbonate was not satisfactory as a differentiating medium because of the difficulty in counting the typhoid colonies. Differential counts of ox and sheep bile agar were not entirely successful as a differentiating medium for any of the lactic organisms except *Bacterium lactis acidi* (Lab.). The medium finally used was a lactose broth, and the method of using is described in detail.

It was found that from 50° acidity up to 68° the lactic acid produced by several lactics was strongly inhibitive to the typhoid organism. The amount of acid as produced by the different organisms had a different effect on the longevity of the typhoid bacillus. It is not known whether this is produced

by a natural variation, which takes place in different cultures of the same organism, or whether it is due to a difference in the by-products other than lactic acid of the different organisms. But there was a certain uniformity in the inhibitive effect. From 60 to 68° acid, the products of 4 different lactic organisms killed the typhoid bacteria within from 19 to 30 hours, being about 24 hours on the average. As a rule, the initial number of typhoid organisms present in broth did not influence the number found at the second plating whatever the acidity of the broth.

Further experiments in the filtration of the lactose broth cultures of different lactic organisms were carried on for the comparison of the acid produced by each, with regard to their relative germicidal powers, and to establish the relationship between lactose broth, whey, and milk with reference to the relative amount of lactose acid which may be produced by the different organisms in the different media. Among the general conclusions drawn are the following: "The minimum acidity produced by *B. lactis acidi* (from sour milk) which will destroy *B. typhosus* is +37° in lactose broth. This corresponds to 80° acid in milk and 28° acid in whey. The minimum inhibitive acidity produced by *B. bulgaricum* is +53° in lactose broth. This corresponds to +208° acid in milk and to 66° acid in whey. The above amounts of acid in milk, corresponding to the acidity produced in whey and lactose broth by the same organism, are theoretically the minimum acidities at which the typhoid bacteria will be killed. However, in raw milk, the medium of natural infection, many factors enter which are never constant, e. g., the character of the initial microbial flora, the flora gained by the necessary exposure to sources of contamination, and the temperature conditions under which the milk is kept after being strained. . . .

"It is very probable that some one of these conditions will occur in the greater number of infected milk samples, since milk infected with typhoid bacteria must have been subjected to sources of contamination from which a varied flora would be acquired. Thus, while this series of experiments brings out some very interesting facts in regard to the influence of fermentation lactic acid upon bacilli, the many factors entering under natural conditions prevent any definite conclusions being made when these natural conditions exist."

A bibliography is appended.

On the presence of streptococci in milk and in the feces of nurslings, R. PUPPEL (*Ztschr. Hyg. u. Infektionskrank., 70 (1912), No. 3, pp. 449–496*).—The streptococci commonly found in milk were found to have a wide distribution, and did not exhibit hemolytic power in human blood as do most pyogenic human streptococci. The streptococci of chronic mastitis in cattle as a factor in intestinal troubles are thought to be exaggerated.

A bibliography is appended.

Reports on the excretion into the milk of cows and goats, and into the milk sinuses of the undeveloped udders of heifers, of tubercle bacilli which had been subcutaneously or intravenously inoculated, A. S. GRIFFITH (*Roy. Com. Tuberculosis, Final Rpt., II, App., 3 (1911), pp. 79–144*).—To determine whether or not tubercle bacilli were excreted in the milk from a normal udder, 4 cows and 7 goats which had not reacted to the tuberculin test were inoculated with cultures and their milk tested subsequently on guinea pigs. Three cows and 5 goats were inoculated subcutaneously, 1 of the cows being subsequently inoculated intravenously; 1 cow and 1 goat intravenously only; and 1 goat was fed.

Tubercle bacilli of relatively slight virulence appeared in milk within 24 hours of their inoculation, and continued to be eliminated therein for long periods subsequently. There arises, therefore, a strong presumption that the

milk of naturally tuberculous cows without udder tuberculosis will contain tubercle bacilli whenever in the course of the disease the bacilli circulate in the blood stream. Further experiments were made to ascertain whether the vaccination of calves intended eventually to supply milk for human consumption is free from the danger which would attend the vaccination of milch cows.

"In 7 out of 11 heifers tubercle bacilli of various types, which had been inoculated in large dose into the subcutaneous tissue, had found their way into the milk sinuses of the undeveloped mamma, and in 4 cases at least were present in such numbers as to suggest that since their arrival there they had undergone multiplication. . . . Though there is not complete evidence that bacilli excreted into the milk sinuses of the immature udder do remain alive therein until the period of lactation begins, the facts established point strongly to the desirability of testing, before permitting its use as human food, the milk of all cows which have been vaccinated as calves with living human tubercle bacilli."

Creamery butter making, J. MICHELS (*Milwaukee, Wis., 1911, 6. ed., rev. and enl., pp. 355, pl. 1, figs. 96*).—In this edition there are new chapters on creamery ice-cream making, eggs as the creamery side line, creamery by-products, advice to young butter makers, gasoline power, and determination of salt in butter.

Helps for the dairy butter maker, E. S. GUTHRIE (*New York Cornell Sta. Circ. 11, pp. 4*).—Directions for making butter are given.

The influence of preservatives on the keeping quality and composition of butter and margarin, K. FISCHER and O. GRUENERT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 10, pp. 553–582*).—The glycerids and protein compounds of butter and margarin were decomposed after a long period of storage. The best preservative was 3 per cent of salt, which delayed decomposition though it did not prevent it entirely. The addition of preservatives such as benzoic acid, salicylic acid, boric acid, and "hydrin" in amounts which could be used safely did not prevent decomposition. The chemical changes taking place in the stored butter were accompanied by changes in flavor and odor.

Fishy flavor in butter, C. J. REAKES, D. CUDDIE, and H. A. REID (*Jour. New Zeal. Dept. Agr., 4 (1912), No. 1, pp. 1–6*).—Pure cultures of organisms isolated from butter having a fishy flavor failed to produce the effect experimentally. Butters of fishy flavor were found to contain a high percentage of acid, and it is therefore thought that a high acidity may be a contributing factor though not the direct cause of the trouble.

The fat content of cream cheese, K. WINDISCH ET AL. (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 9, pp. 489–496*).—Analyses of 75 samples of cream cheese are reported. Over 50 per cent of them contained less than 35 per cent of fat on a dry matter basis, and should be considered only "half fat cheese."

Cheshire cheese making, W. H. HOBSON (*Dairy, 24 (1912), No. 278, pp. 39–41*).—An address in which emphasis is laid upon the details which must be heeded in order to make the best quality of Cheshire cheese.

Analysis of Marolle cheese (*Sta. Agron. Aisne Bul., 1911, pp. 86, 87*).—The average analysis of 6 samples of this semihard cheese was as follows: Water 46.6, fat 24.43, casein 21.96, and ash 4.45 per cent. Those cheeses containing over 50 per cent of water were of inferior quality.

The chemical composition of Russian varieties of cheese made from sheep's milk, P. MELIKOW (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 6, pp. 819–823*).—Analyses are reported of medium soft cheeses made from sheep's milk in different localities. Those made in the Steppes region contained more fat in proportion to the protein than those in the region of the Caucasus.

Cheese score cards, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 33 (1912), No. 17, pp. 706, 707*).—A discussion of the relative values of the various items on cards used for scoring cheese.

Handling whey, W. ANDREWS ET AL. (*N. Y. Produce Rev. and Amer. Cream., 33 (1912), No. 14, pp. 602, 603*).—A symposium on methods for utilizing whey for making butter and milk sugar and for feeding pigs. For the last-named purpose provision must be made for returning the whey in a clean and sweet condition to patrons.

On the power of tubercle bacilli in whey to resist heat, C. BARTHEL and O. STENSTROM (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 49, pp. 23; K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 8, pp. 652–672; Ztschr. Fleisch u. Milchhyg., 22 (1912), Nos. 5, pp. 137–142; 6, pp. 179–187*).—Tubercle bacilli in whey from cows affected with udder tuberculosis were killed by heating at 80° C., either directly by steam or in the water bath, providing all large casein clumps were removed by the use of a hair sieve.

Micro-organisms of kumiss and "katyk," A. A. BATSCHINSKAJA (*Trudy Imp. S. Peterb. Obshch. Estestvo. (Trav. Soc. Imp. Nat. St. Petersb.), 42 (1912), III, No. 2–8, pp. 415–460, figs. 9*).—Two yeasts of the Torula type, *Bacterium rubinsky* and *B. orientale* n. sp., were isolated from "katyk," a preparation of sour cow's milk used for making kumiss. Streptococci were also sometimes present. The organisms thought to be essential for the proper fermentation of kumiss were *B. orientale* and one of the yeasts.

Bacterial population of Don curd, A. M. KOLENEV (*Viestnik Bakt. Agron., Stantsii V. K. Ferreĭn, 1911, No. 18, pp. 34–48*).—Lactic fermentation in Don curd was found to be induced by 2 organisms, (1) a race of *Streptobacillus lebenis*, that produces a slight fermentation with a low acidity, and (2) a new species of streptococcus differing from that isolated by Muravyev (E. S. R., 22, p. 384) mainly by its anaerobic nature. The latter was more stable under the influence of heat and temperature than the streptobacillus. *Bacillus lactis acidi* was absent.

By-products of milk, P. DAIRE (*Indus. Lait [Paris], 37 (1912), No. 9, pp. 131–137*).—This contains data on the utilization of skim milk and buttermilk and the manufacture of casein.

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Handbook on milk, H. RIEVEL (*Handbuch der Milchkunde. Hanover, 1910, 2. ed., rev., pp. X+463, figs. 38*).—This is the second revised edition of this work (E. S. R., 19, p. 471), which has been prepared especially for the use of the veterinarian and student of veterinary medicine.

A new method of counting leucocytes, R. A. P. HILL (*Lancet [London], 1912, I, No. 1, p. 20*).—"The advantage of the method here described is that a total and differential count may be done simultaneously, the whole process taking about 10 minutes or less. The only apparatus needed besides the usual Thoma pipette and slide is a small cylindrical tube graduated and corked. The tube of a Haldane's hemaglobinometer cut down to the level of the 120 mark is very convenient."

The diluent and reagent used for the method consists of 12 parts of distilled water, 3 parts of acetone, 1 part of methyl alcohol, and 4 parts of Wright's modification of Leishman's stain. It is necessary to filter the Wright stain at the time of making up, and, furthermore, to shake the reagent each time before using.

In regard to immunizing with lipoids, K. MEYER (*Centbl. Bakt. [etc.], 1. Abt., Ref., 50 (1911), Beiheft, pp. 65–67*).—Despite the fact that lipoids have

a specific complement-fixing power, they are not capable of stimulating the production of antibodies. The lipoids used in these experiments were obtained from cestodes.

The variability of the bacteria of the enteritidis group, F. M. SCHMITT (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 9 (1911), No. 3–4, pp. 188–224*).—As a result of this work the author points out that the marked changes in the agglutinin-fixing properties of some Flügge strains of the enteritidis bacterium probably support the view that both of the chief members of the enteritidis bacteria group (that is, the *Bacillus enteritidis* (Gärtner) and the *B. paratyphoid* B) which seem to be different according to various immunity reactions, are in reality variations of the same organism.

Cotton-seed poisoning of live stock, R. R. DINWIDDIE and A. K. SHORT (*Arkansas Sta. Bul. 108, pp. 395–410*).—The experiments here reported were undertaken mainly to test the effects of various methods of treatment of cotton-seed meal in removing or lessening the toxic action of this feed; also to learn if any substance was removed from cotton-seed meal by simple methods of extraction with aqueous and acid solvents, or by cooking, which would produce in animals symptoms comparable with those produced by the untreated meal in corresponding amounts.

The following is a summary of the investigations as drawn by the authors:

"It was found, in one trial, that 'fermentation' or decomposition of cotton-seed meal for 48 hours at a temperature of 20 to 28° C. did not lessen its toxic action when fed to pigs.

"Cotton-seed meal, from which 2 per cent more of fat had been removed by extraction with gasoline, showed no diminution of toxicity.

"In 2 trials it was found that cold aqueous extraction removed from cotton-seed meal no substance which could be shown to be toxic for pigs.

"The extract similarly obtained by dilute hydrochloric acid proved nontoxic in one trial. In a second test a temporary sickness occurred in one animal, the identity of which with cotton-seed poisoning was not established.

"The fluid strained from cotton-seed meal, after prolonged steaming, caused death with symptoms and post-mortem changes of cotton-seed poisoning in one case. This fluid, however, was not a clear solution of matters extracted from the meal, but contained much material in suspension. The meal itself after such cooking and separation of the fluid also proved toxic.

"In young cattle (fattening steers) symptoms of poisoning appeared after a consumption of cotton-seed meal (along with hulls) equal to from 75 to 108 per cent of the body weight. The anatomical lesion of cotton-seed poisoning of cattle is an interstitial keratitis which may end in complete blindness.

"In hogs there is a degeneration of the muscular tissue of the heart and of the parenchyma of the liver and kidneys, with extreme passive congestion of all the viscera and fluid effusion into the serous cavities, especially the pleura. Hogs which have recovered and regained their thrift did not show, after slaughter, any microscopic changes in these organs.

"It may be noted, finally, that the ill effects resulting from the feeding of cotton seed may be due to a prolonged absorption of poisonous products generated in the digestive tract by decomposition or putrefactive changes peculiar to this feed. The problem, however, has not yet been approached from this point of view."

The causation of molteno, pictou, or Winton disease in cattle and horses (*Bul. Imp. Inst. [So. Kensington], 9 (1911), No. 4, pp. 346–351*).—This is a brief summarized account.

The insect parasites of domestic animals in Argentina, K. WOLFFHÜGEL (*Rev. Med. Vet. Montevideo, 2 (1911), Nos. 8–9, pp. 354–372; 10–11, pp. 457–481,*

fig. 1).—The first paper deals with the Mallophaga and Siphonaptera, the second with the Diptera. Among the parasites considered at some length are the fleas *Pulex irritans*, *Ctenocephalus canis*, and *C. felis;* the muscids *Chrysomyia macellaria* and *Stomoxys calcitrans;* the sarcophagid *Sarconesia chlorogaster;* the sheep tick (*Melophagus ovinus*); the braulid *Braula cæca;* the oestrids *Œstrus ovis*, *Gastrophilus nasalis*, and *G. pecorum*, the ox warble (*Hypoderma bovis*), and *Dermatobia hominis*, particular attention being given to the last mentioned.

A contribution to the knowledge of the survival of Bacillus coli and anthrax spores, B. Busson (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 58 (1911), No. 6, pp. 505–509*).—The author found that anthrax spores dried upon silk threads remained alive for 17 years and were capable of giving rise to a growth pathogenic for white mice.

The influence of the culture medium on the germination of anthrax spores, with special reference to disinfection experiments, R. T. Hewlett and G. N. Hall (*Jour. Hyg.* [*Cambridge*], *11 (1911), No. 4, pp. 473–480*).—"The experiments show that a broth medium is quite unsuitable as a test culture medium to determine the vitality of anthrax spores in disinfection experiments, whereas agar is a suitable and delicate medium for the purpose, even when considerable traces of the disinfectant are carried over with the inoculation.

"The reason for this inefficiency of broth is not obvious. We thought it might be due to the absence of bacillar forms in the sporing material, but the emulsion of spores heated to 80° C. for 15 minutes and then inoculated directly into broth gave good growths. Absence of oxygen might be another factor, but the results were the same when splinters of sterilized wood infected with anthrax spores were treated. The wood floated on the surface of the broth and so was subjected to a free supply of oxygen, yet no growths were obtained in broth when the splinters were soaked in the disinfectants, while good growths were obtained on agar. The control splinters gave good growths in broth. It may be that the anthrax spores are partially devitalized by the action of the disinfectant and that in this condition broth is a comparatively unsuitable culture medium for them. Prolonging the time of incubation of the broth cultures up to 10 or 14 days makes no difference. If a culture in broth shows no growth in 48 hours, a growth hardly ever appears with more prolonged incubation. Nor is this superiority of agar over broth as a culture medium confined to the emulsified disinfectants employed in these experiments, for similar results have been obtained with phenol and with formaldehyde, the latter both in the fluid (formalin) and in the gaseous conditions."

The prevention of anthrax infection due to imported hides and skins, C. W. Ponder (*Lancet* [*London*], *1911, II, No. 19, pp. 1260–1262*).—Previously noted from another source (E. S. R., 25, p. 883).

Protective action of the capsule of the anthrax bacillus, F. Fischoeder (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 60 (1911), No. 1–2, pp. 142–148*).—The author here points out the advantages of using encapsulated anthrax bacilli for shortening the course of the disease.

Some findings in foot-and-mouth disease, Huntemüller (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 61 (1911), No. 4–5, pp. 375–378, pls. 2*).—The contents of fresh, unbroken apthæ from the lips and tongues of bovines which were present 24 hours after the inception of the disease were examined in the hanging drop. In addition to this, sections were made of the tongues of shoats which died of the disease.

In all cases small globules about the size of the usual cocci were noted which had in their interiors a highly refractive body. On a warm stage it was observed that these refractive bodies within the larger of the cells underwent

division into 2 such bodies, and so on. The smaller cocci could be made to pass through a Berkefeld filter and a colloidal filter.

The treatment of foot-and-mouth disease by Doyen's method, G. Moussu (*Rec. Méd. Vét., 88 (1911), No. 17, pp. 533–541*).—A critical discussion in regard to this method and its origin. The results obtained with it were unfavorable.

The probable influence of the open water trough in the spread of glanders, A. T. Kinsley (*Amer. Vet. Rev., 40 (1912), No. 5, pp. 633–638*).—A paper presented at the fifteenth annual meeting of the United States Live Stock Sanitary Association, held at Chicago in December, 1911.

The incidence of Mediterranean fever in Malta and its relationship to the size of the goat population, J. W. H. Eyre (*Lancet [London], 1912, 1, No. 2, pp. 88, 89, figs. 3*).—It is pointed out that the main causative factor in reducing the prevalence of Malta fever on the Island of Malta was the destruction of large numbers of milch goats, many of which produced milk containing *Micrococcus melitensis*. The goat population of Malta was reduced from 17,110 in 1907 to 7,619 in 1910.

About the sero-diagnosis of Malta fever, Rouslacroix (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 10, pp. 397–399*).—The results show that in most instances where a serum specific for the *Micrococcus melitensis* was employed no agglutination reaction with the *Bacillus typhosus* was obtained. In only 1 out of 56 cases (1.84 per cent) did the serum agglutinate positively for both organisms. The dilution of the specific serum used was 1:50. In cases where a double reaction is obtained an infection with both organisms must be suspected.

Piroplasms of zebus and of their crosses in Tunis, W. L. Yakimoff and Nina Kohl-Yakimoff (*Bul. Soc. Path. Exot., 4 (1911), No. 7, pp. 451, 452*).—The authors have examined the blood of 2 zebus, of 12 zebu crosses with native cows, and of a cross with a French cow, and found piroplasms to be present in the blood of both the zebus and in 10 of the 13 hybrids. The piroplasms observed appear to belong to a single species, either *Piroplasma bacilliformis* or *P. parva*. In no instance was *P. bigeminum* discovered. Whether or not the organism is pathogenic in these animals was not determined. Attention is called to the double importance obtaining, first, in the zebu and zebu hybrids furnishing a reservoir for the virus in its transmission to native stock and that imported from France, and, second, in the lowered resistance of the zebus and their crosses to other infectious diseases.

Immunizing against rabies, C. Fermi (*Centbl. Bakt. [etc.], 1. Abt., Orig., 61 (1912), No. 7, pp. 596, 597*).—The method utilized consisted of giving normal and rabid nerve substances per mouth. All animals were found to be immune upon feeding for a period of 2 months. This was determined by subcutaneous infection with the street and fixed virus. No deaths resulted.

An antirabic vaccine, D. Semple (*Brit. Med. Jour., 1911, No. 2642, p. 392; abs. in Vet. Rec., 24 (1911), No. 1209, p. 171*).—As the methods commonly used for preparing antirabic vaccine are somewhat unsatisfactory, the author recommends making "an 8 per cent dilution of rabies virus in normal saline, to which 1 per cent carbolic acid is added, and to keep this at a temperature of 37° C. for 24 hours. By this means the virus is killed. The mixture diluted with an equal bulk of saline solution gives a vaccine containing 4 per cent virus and 0.5 per cent carbolic acid. This was found to confer a high degree of immunity on monkeys, dogs, and rabbits, and the serum obtained from these animals had a well-marked rabicidal action on living virulent virus."

The action of formaldehyde upon tetanus toxin and other bacterial toxins, M. von Eisler and E. Löwenstein (*Centbl. Bakt. [etc.], 1. Abt., Orig., 61 (1911),*

No. 3, pp. 271–288).—Tetanus toxin (bouillon) containing from 1 to 2 per cent of formaldehyde, when exposed to a 1/4 ampere Nernst light for from 2 to 3 weeks, either lost its toxicity completely or was reduced considerably in strength. When the toxin was in an atmosphere of hydrogen the action of the Nernst light was less effective. Ordinary temperatures (30° C. on the average) were found to affect the tetanus toxin in the same manner, but the process did not go on quite so rapidly nor was it so complete. When such toxins were placed in a refrigerator containing 3 per cent or more of formaldehyde the activity of the toxins was also affected. The toxins obtained from the various strains of bacilli were found to behave differently as regards resistance, incubation time, and the immunity which they produced. By injecting guinea pigs and rabbits with toxins treated in the above-mentioned manner, an immunity of high degree could be produced, and which depended upon the production of specific antibodies. The toxin of the vibrio, denoted as El Tor V, was weakened considerably by exposure to the Nernst light, and particularly in its power to hemolyze the red blood corpuscles. Only slight changes were produced in diphtheria and dysentery toxins, and none at all in tuberculin.

Tetanus successfully treated with magnesium sulphate, W. A. Dykins (*Vet. Rec., 24 (1911), No. 1213, p. 218*).—A description of a case in a heifer calf which was treated by giving subcutaneous injections of a saturated solution of Epsom salts into each side of the neck. Twenty cc. was given in each instance, and the injections were continued for a few days. The owner of the animal had previously administered 2 lbs. of magnesium sulphate per os.

A new method for distinguishing the bovine type and the human type of tubercle bacillus, P. Chaussé (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 3, pp. 143, 144*).—Inhalation tests were conducted with the sputum and caseous material from human and bovine tuberculous subjects and cats and dogs. Certain differences were noted in the nature of the development of the tubercles in the lungs of these animals. The author believes that these differences can be employed for determining what type of bacterium has caused the disease in the respective subjects. The dog can be used to better advantage than the cat for this purpose.

Tuberculosis and tuberculin, J. Lignières (*Bul. Soc. Cent. Méd. Vét., 88 (1911), No. 20, pp. 433–436*).—After discussing the limitations of the usual subcutaneous tuberculin test, the author points out that where a positive reaction is obtained tuberculosis is surely present, but that when the reaction is negative there is no certainty as to whether tuberculosis is present or not. It is, therefore, a good plan to conduct some of the other forms of tuberculin reactions, such as the ophthalmic test, in conjunction with the subcutaneous test.

In regard to the preparation of tuberculous antigens, A. Calmette and L. Massol (*Compt. Rend. Soc. Biol. [Paris], 71 (1911), No. 29, pp. 341–344*).—A description is given of a method for preparing antigens for use in the complement fixation reaction which are capable of combining with the various groups of antibodies contained in the serum of tuberculous subjects.

A method for isolating and cultivating the Mycobacterium enteritidis chronicæ pseudotuberculosæ bovis, Jöhne, and some experiments on the preparation of a diagnostic vaccine for pseudo-tuberculous enteritis of bovines, F. W. Twort and G. L. Y. Ingram (*Proc. Roy. Soc. [London], Ser. B, 84 (1912), No. B 575, pp. 517–542*).—From the experiments detailed in this paper, the authors find it possible to deduce certain conclusions, the most important of which are as follows:

"The acid-fast bacillus present in cases of pseudo-tuberculous enteritis of bovines, and known as Jöhne's bacillus, fails to grown outside the animal body on any of the artificial media at present used by bacteriologists. The bacillus

shows no definite growth on fresh bovine tissue or fresh extracts of bovine tissue removed aseptically and placed into sterile tubes. There is no evidence that Jöhne's bacillus grows in symbiosis with an ultra-microscopic virus.

"The specific bacillus will grow on media containing the dried and powdered growth of certain acid-fast bacilli which have been previously killed, and this is so even when the dead bacilli have been kept for a period of 8 years, and subjected to a temperature of 115° C. in the autoclave for 1 hour. The most suitable bacillus to incorporate in the medium is the timothy-grass bacillus, and to a somewhat less degree the smegma bacillus of Moeller and the nasenschleim bacillus of Karlinski. The human type of tubercle bacillus is also good, but on media containing the avian type Jöhne's bacillus grows very slightly, if at all. With the few bovine strains tested in media we were unable to get any definite evidence of growth with Jöhne's bacillus. Tubercle bacilli isolated from cats also gave negative results. The essential substance or substances necessary for the growth of Jöhne's bacillus can be extracted from the various acid-fast bacilli which give positive results by means of hot ethyl alcohol. We have isolated Jöhne's bacillus from 5 consecutive cases of pseudo-tuberculous enteritis, and have proved the morphological and biological characters of the bacilli isolated to be identical in every respect. . . .

"The specific bacillus, when inoculated intravenously or given by the mouth to bovines, reproduces pseudo-tuberculous enteritis in the animal, and this can not be distinguished from the original disease either clinically during life or post-mortem. Further, the bacillus can be recovered from the lesions in the intestine of the inoculated animal, and shows characters in every way identical with the bacilli isolated from the original cases.

"Animals suffering from pseudo-tuberculous enteritis, either normally contracted or experimentally produced by the inoculation of pure cultures of Jöhne's bacillus, give no definite reaction with diagnostic vaccines prepared from cultures of the timothy-grass bacillus or from the avian tubercle bacillus. Vaccines can be prepared from cultures of Jöhne's bacillus similar to those prepared from other acid-fast bacilli. Diagnostic vaccines prepared from cultures of Jöhne's bacillus grown on tubercle bacillus medium gave positive reactions with tubercular animals, which proved the medium used to be unsuitable for the preparation of a specific diagnostic vaccine for pseudo-tuberculous enteritis. Vaccines prepared from cultures of Jöhne's bacillus on a timothy-grass bacillus medium gave negative reactions with normal and with tubercular animals, and also with bovines suffering from pseudo-tubercular enteritis. We believe this to be due, partly to the small amount of growth in the fluid media, and partly to the fact that most of the growth was obtained from solid media and therefore not made in the same manner as diagnostic tuberculin. We also believe that a highly concentrated vaccine will be required, and that we shall be able to prepare this now that one of our strains of Jöhne's bacillus has started to grow on the surface of fluid media containing the timothy-grass bacillus."

A bibliography of 42 titles is appended.

Infectious abortion of bovines, Zwick (*Deut. Tierärztl. Wchnschr., 19 (1911), No. 51, pp. 781–785; abs. in München. Tierärztl. Wchnschr., 56 (1912), No. 2, pp. 36–38*).—Previously noted from another source (E. S. R., 24, p. 785).

A flagellated organism encountered in a vulvo-vaginal pustulo-ulcerous eruption in a buffalo, I. Poenaru (*Compt. Rund. Soc. Biol. [Paris], 70 (1911), No. 15, pp. 624, 625; Vet. Rec., 24 (1911), No. 1215, p. 246*).—A microscopical examination of the scrapings from ulcers obtained from a case of pustulo-ulcerous inflammation of the vagina, which later involved the urethra and the bladder, revealed the presence of an organism, among many others, which "had

the appearance of a spermatozoon, with an ovoid body from 6 to 8 μ long and a flagellum of from 30 to 55 μ.

"The protoplasm of the body showed but little differentiation and was covered by a cuticle. The organism was slow in its movements, and together with its associated microbes lived for a long time in pure water and in sugared bouillon, especially at the bottom of the glasses in which the scrapings from the ulcers had been collected. [The author] did not succeed, however, in either inoculating it or cultivating it. Repeated examinations of hanging drop preparations made for a period of some days did not reveal the least multiplication of the organism. At the end of 3 months the flagellum fell away. The body of the organism still remained visible in the bouillon for some time, and then in its turn became disintegrated.

"This organism evidently represents a flagellate, and seems somewhat similar to the one which Grimm, in 1894, discovered in the pus of pulmonary and hepatic abscesses in a Japanese peasant woman, and which Blanchard designated Monaspyophila, although it does not possess the small flagellum of Monas. . . . Several attempts [were made] to infect rabbits by inoculating them in the vagina with scrapings from the ulcers, and also with the vaginal discharge, and in every case failed to transmit the disease, the flagellates only living a few days in the vaginas of the rabbits."

Bacteriological findings with hog cholera, HAENDEL and GILDEMEISTER (*Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 50 (1911), Beiheft, pp. 137–140*).—Commenting on Glässer's (*Bacillus typhi suis*) and Dammann's (*B. suipestifer* Voldagsen) work in regard to the causative agent of hog cholera, the authors give their results of a study of these and some other related organisms.

The findings do not agree with any of the work previously reported, and the authors are inclined to believe that the presence of these organisms in cases of hog cholera is due to secondary infection.

Studies of agglutination reactions in hog cholera during the process of serum production, W. GILTNER (*Michigan Sta. Tech. Bul. 8, pp. 40*).—On continuing the investigations previously reported (E. S. R., 22, p. 586), it was found that *Bacillus cholerœ suis* was present in many cases of hog cholera, and was capable of producing a disease in pigs which is quite similar to hog cholera. On the other hand, a living virus capable of producing hog cholera was found to pass through a Chamberland filter. A filtrate was obtained free from organisms demonstrable by the existing methods.

It was furthermore noted that "the blood of normal (untreated) pigs may agglutinate virulent cultures of *B. cholerœ suis* in dilutions as high as 1:250, usually less. The blood of young pigs contains less agglutinin as a rule than that of old pigs.

"The blood of pigs having hog cholera as a result of virus inoculation may agglutinate *B. cholera suis* in dilution as high as 1:800 but usually at a less dilution. Here again age is a factor in that old pigs develop more agglutinin than young ones. (Old pigs are likewise more resistant to hog cholera infection.)

"The blood of pigs treated by the serum-simultaneous method may agglutinate *B. cholerœ suis* in dilutions as high as 1:500.

"The agglutination reaction seems to be one of immunity, not of infection, at least, agglutinins develop in connection with immunity but perhaps not as a factor in the condition of immunity. This deduction is based upon the observation that a large percentage of pigs treated by the serum-simultaneous method shows a low agglutinative power in the event of death, while of those that live 50 per cent shows the highest agglutinative power.

"During the process of hyperimmunization, the agglutinin content of a pig's serum increases as a rule as the amount injected increases, and may fall during the tail bleedings unless more virus be injected.

"If the agglutinogen in the virus is *B. cholerœ suis* then the quantity of agglutinogen (number of *B. cholerœ suis*) injected into a large serum hog during the whole process of hyperimmunization would ordinarily (if only freshly drawn virus is used) be less than would be contained in 0.1 cc. of a 24-hour bouillon culture of *B. cholerœ suis.*

"The injection of a number of *B. cholerœ suis*, in bouillon culture, equal to that found in the total quantity of virus sufficient to hyperimmunize a large pig fails to stimulate the production of agglutinin to such an extent as is the case when the virus is injected.

"Over one-third of the cases of serum hogs studied furnish a serum agglutinating at a dilution of 1:50,000.

"The Dorset-Niles serum retains its agglutinative power for several days, almost unimpaired, when preserved in 0.5 per cent carbolic acid, trikresol, or formalin. The agglutinative power of a serum may diminish 50 per cent, more or less, after a period of 6 to 8 months.

"The potency of the Dorset-Niles serum, the biological test being the standard, can not be measured uniformly by its agglutinative power for *B. cholerœ suis.* However, the biological test with pigs is a variable standard.

"Serums of high agglutinative power, i. e., reacting at 1:2,000 or above, were potent in 85.71 per cent of cases and not potent in 14.28 per cent; serums of low agglutinative power, i. e., reacting at 1:1,000 or less, were potent in 45.45 per cent of cases and not potent in 54.54 per cent.

"The agglutinability of the different cultures used by us indicates that they belong to the same strain. They were isolated from the spleen of virus pigs treated by virus having a common origin. We therefore believe that these cultures originated in the original virus and not in an alleged normal habitat in the pig's intestine.

"[The author] believes that the relation of *B. cholerœ suis* to the porcine organism and to the filterable virus, and all the interrelation of these 3 factors in the production of a swine disease should be settled." For instance, it was found that "the protection offered by the Dorset-Niles serum against the filterable virus may also extend to virulent cultures of *B. cholerœ suis.* Whether it is necessary to protect against *B. cholerœ suis* in practice was not determined. The relation of *B. cholerœ suis* to the filterable virus or to natural outbreaks of hog cholera was not determined by this work or to the satisfaction [of the author] by the researches of others." "A scientific understanding of hog cholera is impossible without this solution. The economic problems involved in the production of the Dorset-Niles serum or any other biological therapeutic agent for hog cholera and the sanitary police control and eradication of this disease demand it."

Investigations of the pathological histology, pathogenesis, and post-mortem diagnosis of contagious cerebro-spinal meningitis (Borna disease) of the horse, E. JOEST and K. DEGEN (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 9 (1911), No. 1–2, pp. 1–98, pls. 6; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 25, pp. 453, 454; Jour. Compar. Path. and Ther., 24 (1911), No. 4, pp. 369, 370*).—"The disease is an acute, diffuse, infiltrative, nonpurulent, meningo-encephalitis and myelitis of the lymphocyte type and chiefly mesodermal (vascular) in character. The albumin and chlorin contents of the cerebro-spinal fluid of horses suffering from the disease do not differ from those found in horses not suffering from diseases of the nervous system.

"Histological examination of the pia mater shows a slight meningitis of a mononuclear type, which plays quite a secondary part compared with the inflammatory alterations in the nervous tissue. It is probably a so-called meningeal irritation. The vessels of the brain and, to some extent those of the spinal cord show, as a rule, pronounced inflammatory infiltration of their external coats, and partly also of their perivascular lymph spaces. The infiltrating cells are principally lymphocytes; polyblastic and other kinds of cells and polynuclear leucocytes are not seen. The same inflammatory cellular infiltrations are diffused widely through the substance of the brain and spinal cord. They are in close connection with the vascular infiltrations.

"The disease does not resemble epidemic cerebro-spinal meningitis in man as regards its pathological anatomy. The lesions of Borna disease show considerable resemblance to those of rabies, fowl plague, trypanosomiases, and, above all, to those of anterior poliomyelitis. As a result of his investigations, Joest names the disease 'infectious inflammation of the brain and spinal cord of the horse' (encephalitis et myelitis enzootica equi)."

A bibliography of 38 titles is appended.

Pectoral form of equine influenza and acute actinomycosis, Schütt (*Berlin. Tierärztl. Wchnschr., 28 (1912), No. 2, pp. 25–27*).—As a result of examining particles from the lungs of horses and some grain moths (species not described), the author concludes that contagious pleuro-pneumonia is an acute actinomycosis. The moth is supposed to be the carrier of the infection.

Practical experiences in regard to vaccinating against canine distemper, C. Berndt (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 43, pp. 777, 778*).—The author points out here as a result of his experiences with antidistemper serum that it can be used to great advantage by veterinarians having a canine practice.

RURAL ENGINEERING.

Report of investigations of methods of clearing logged-off lands in western Washington, H. W. Sparks (*Washington Sta. Bul. 101, pp. 3–28, figs. 5*).—Studies carried on in cooperation with the Bureau of Plant Industry of this Department are reported with reference to the most economical use by the small farmer of fire as an agent for clearing logged-off lands.

Three methods in successful use by the farmers who are regarded as the originators are described. Cost data and other figures obtained in tests of these methods are reported.

Detailed directions are given for using the "char-pit" method of destroying stumps, which consists essentially in firing around the stump and building a tight soil cover up from the bottom to retain the heat. Air enters freely at the bottom and the heat rises but is reflected back against the burning stump. The method derives its name from the supposed similarity of its principles to those used in burning charcoal in commercial work.

The results of 16 different experiments carried out by the author show that the "char-pit method" may be successfully practiced in both clayey and sandy soils and with wet stumps where proper precautions are taken. Fuel oil mixed with dry sawdust may be economically and satisfactorily used to kindle fires around the base of stumps where cheap fuel is not available. Roots that have not burned deeply enough may be burned a second time.

The practical design of irrigation works, W. G. Bligh (*New York, 1910, 2. ed. rev. and enl., pp. XXVII+449, pls. 12, figs. 244*).—This volume consists of a general study of the essentials of design of irrigation works.

Irrigation works, H. BROWN (*London, 1910, pp. 34, pls. 2*).—This pamphlet contains lectures on the scope of irrigation works and features of their design and construction.

Irrigation by gravity, L. FONTAINE (*Rev. Vit., 36 (1911), No. 928, pp. 358–363, figs. 10*).—This article points out the benefits of irrigation and outlines the general methods of surveying and computing profiles and grade lines for gravity irrigation. The more practical and economical methods of conveying water down hillsides are described and the details of a practical method of gravity irrigation are explained. Different styles of headgates to regulate the flow of water into these laterals are discussed.

Irrigation in correct practice, A. WOLF (*Northwest Hort., 25 (1912), No. 3, pp. 72, 73*).—This is an abstract from an address made by S. O. Jayne before the Ellensburg Farmers' Institute.

The author states that the essentials of successful irrigation are an adequate supply of water and the right use of the water. Inasmuch as the chief function of water is that of a medium by which the nutrients in the soil may be taken up by the plant roots, the soil should be carefully prepared and the flow of water well regulated in order to secure a uniform distribution of moisture. The character of the soil and nature of the crop should be considered in preparing the soil for irrigation and in regulating the amount of irrigation, as these factors vary with different crops and kinds of soils. In regulating the irrigation flow the irrigator should exercise judgment as to when to begin irrigating, when to stop, and how much cultivation and fertilization is required.

Chart for solution of problems in irrigating waters, H. C. OGDEN (*Engin. Rec., 65 (1912), No. 10, p. 275, fig. 1*).—A chart for use in calculating deliveries of irrigating water on the second-foot or acre-foot basis is described.

A preliminary report on drainage reclamation in Georgia (*Geol. Survey Ga. Bul. 25, 1911, pp. 123, pls. 12*).—This includes a preliminary report on Drainage Conditions in Georgia, by S. W. McCallie, state geologist, and a report on drainage examinations and surveys conducted by the Drainage Investigations of this Office, 1908–1911.

The investigations show that the Georgia swamp lands aggregate 2,700,000 acres and that the largest individual tract, the Okefinokee swamp, comprises an area of about 500,000 acres. The waste lands needing drainage are discussed under the subheads of swamp lands, overflow lands, wet lands, and salt-marsh lands.

The State Geological Survey of Georgia reports on the drainage investigations and surveys of about 32,000 acres of swamp and overflow lands in the counties of Baker, Calhoun, and Dougherty, giving the methods and details of the surveys. The results showed that although the country is quite flat and the velocity of the streams very small, drainage ditches can be constructed with proper cross section and sufficient fall to reclaim this entire territory.

Reports of various preliminary investigations are submitted for Bryan, Chatham, Clinch, and Echols counties, by J. V. Phillips; for Glynn, Liberty, and McIntosh counties, by F. G. Eason; for Telfair County, by J. R. Haswell; and for Floyd and Jackson counties, by L. L. Hidinger. The investigations in each county are discussed under the subheads of location and description of swamps, natural drainage channels and outlets, typical areas needing drainage, past drainage, soil character, general topography, rainfall and run-off, present farming conditions, and opportunities for reclamation. Special attention is given to the improvements of the McRae branch in Telfair County, the Berry School Farm in Floyd County, and the Mulberry River in Jackson County. Watershed and location maps, rainfall data, and specifications for each improvement are also given.

A draft of a proposed state drainage law is included as an appendix to the report.

Land drainage by pumping, S. M. Woodward (*Engin. Mag., 43 (1912), No. 1, pp. 107–109*).—This article calls attention to the growing use of pumps for land drainage, discusses the cost of drainage by this method, and states the essential points to be considered in the general design, construction, and operation of a drainage system of this kind.

The art of road making, H. Frost (*New York and London, 1910, pp. XVII+544, pls. 3, figs. 261*).—This volume outlines the history of road building, discusses the problems of location, construction, and maintenance of roads, and presents the fundamental and essential principles of road building. It presents a general knowledge of the art of road building to the nontechnical man and indicates to the technical expert where reliable and specialized information can be obtained.

The chemistry of modern highway engineering, P. Hubbard (*Surveyor, 41 (1912), No. 1051, pp. 400–402*).—This is an address before the American Association for the Advancement of Science, December 30, 1911.

Inasmuch as bituminous materials are rapidly replacing mineral constituents of rocks as road binders, the author suggests that the highway engineer or commissioner should have a knowledge of hydrocarbon chemistry and the chemistry of bitumens to aid in tests and specifications of bituminous binders.

Road improvement in the South, past and present, L. W. Page (*Manfrs. Rec., 61 (1912), No. 7, pt. 2, pp. 57–59*).—This article deals with the poor road conditions and administration in the 16 southern States in the past, and calls attention to the rapid improvement in road construction, maintenance, and administration in these States during the past 8 years. In 1911 the estimated expenditures for road improvements amounted to $46,225,000.

The use of electricity in agriculture, W. D. Buchanan (*Amer. Thresherman, 14 (1912), No. 11, pp. 7, 8, fig. 1*).—This is a paper read before the Oregon Thresherman's Association, December, 1911. An outline of the uses to which electrical energy can be put on the farm is given and the saving in time and labor is given, and some of the present practical methods of installing electrical service in farming localities are briefly discussed.

The small farm tractor, W. J. Brandon (*Amer. Thresherman, 14 (1912), No. 11, pp. 18–20*).—This is a paper read before the American Society of Agricultural Engineers held at St. Paul, Minn., December 28, 1911. The author points out the growing need for a small farm tractor which is equipped to do the general field work of plowing, harrowing, disking, etc., the road hauling, heavy and light, and the general belt work on a farm of average size.

Farm wagons, F. Schiffmann (*Arb. Deut. Landw. Gesell., 1910, No. 173, pp. 1–33, figs. 23*).—In this report may be found a general description of the construction and operation of 4 types of farm wagons, viz, the Old German, or Silesian, wagon; the Magdeburg, or Thuringian, wagon; the platform, or American, wagon; and the Hornburg wagon. Results are given of tests made by the German Agricultural Society under the general headings of load capacity, management, tractive power required, materials, and cost, the wagons being tested with loads of grain, hay, straw, sand, earth, stones, manure, root products, and packed farm produce. Tractive power results were taken on firm roads and in the fields, and loading capacity results on each wagon by using all its equipment for all the uses to which it could be put.

The results of all tests favored the Magdeburg wagon as the best all-round farm wagon, with the Silesian second, the American third, and the Hornburg fourth.

Concrete silos (*Chicago and Pittsburg, 1911, 1. ed., pp. 88, figs. 74*).—This pamphlet discusses the theory and use of silos and silage and gives practical information relative to the location, design, construction, and cost of monolithic reenforced concrete silos and concrete block silos.

Water power for the farm and country home, D. R. COOPER (*Albany, N. Y.: State Water Supply Com., 1911, 2. ed., pp. 45, figs. 31*).—This pamphlet has for its purpose the calling of attention to the large amount of undeveloped small water power in the State of New York and the uses to which it can be put on the farm. It outlines briefly the amount of work which can be done by a small water power plant of average capacity, and calls attention to several successful examples and the details and cost of construction of each. A general method of procedure and an outline of the prime requisites in planning and constructing small water power plants for use in farm work are given under the heads of maximum and minimum stream flow, tributary drainage area, water storing, available head, concentration of head, location and construction of dam and power house, types of water wheels and connections, dynamo and storage batteries, transmission, motors and connections, and efficiency determination.

Home labor saving devices, MRS. J. A. WIDTSOE (*Dry Farming Cong. Bul., 6 (1912), No. 3, pp. 105–112*).—A plea for labor saving devices in the farm home, including a discussion of the cost of such articles as compared with that of the labor saving agricultural implements ordinarily used on farms of various sizes.

RURAL ECONOMICS.

Tenancy in the Western States, B. H. HIBBARD (*Quart. Jour. Econ., 26 (1912), No. 2, pp. 363–376*).—This is one of a series of articles discussing tenancy and its problems in the various groups of States in the United States (E. S. R., 26, p. 686).

One of the most prominent characteristics noted of this group is its newness and relatively small percentage of tenancy, only 16.6 per cent of the farms being in the hands of tenants in 1900 and 14.1 per cent in 1910. This low and decreasing percentage is attributed to 2 mean causes: (1) The great number of new farms taken from the public domain has increased the number of owned farms and contributed but little to the number of tenant farms; (2) the development of special lines of agriculture, particularly the growing of fruit, has resulted in an increase in the number of small farms in the hands of owners. It is further stated that the wheat-growing industry has greatly declined in many sections of these States within the last decade, and that the proportion of farms in the hands of tenants has decreased accordingly.

Tenancy is found to increase with the value of the land. Thus, in California, the percentage of tenancy is 20.1 in counties where land is worth $60 or more per acre, and is 22.5 in counties where values run from $30 to $60 per acre. However, some counties in Colorado with land selling for $35 and over per acre show 25.7 per cent of tenancy, and others with land at from $20 to $35 per acre show 30.8 per cent.

Farm tenancy in the United States, B. H. HIBBARD (*Ann. Amer. Acad. Polit. and Soc. Sci., 40 (1912), No. 129, pp. 29–39*).—A few broad generalizations are here drawn.

That there has been an uninterrupted increase in the proportion of tenancy in the United States for the last 30 years is clearly illustrated. In 1880 out of each 100 farms, 25 were operated by tenants, by 1890 the number had risen to 28, by 1900 to 35, and by 1910 to 37. However, the rate of increase seems to be decreasing, there being actual decreases in the proportion of tenant farms in some of the geographic divisions, the proportion varying in many cases with the value of land per acre, the value of farms as units, or the character of farming.

Some of the evils of the tenant system are noted as soil exploitation and speculation, and the lack of interest the tenant takes in schools, churches, roads, farmers' organizations, etc. As a step toward correcting the evils and enabling the tenant to buy land, the author suggests a better credit system and a more economic means of marketing farm products and buying supplies.

Tenant farmers and sales of estates committee (*Rpt. Dept. Com. Bd. Agr. and Fisheries* [*Gt. Brit.*], *on Position Tenant Farmers, 1912, pp. 42*).—This is a report submitted to Parliament by a special committee appointed to inquire into the condition of tenant farmers in Great Britain and consider what legislation, if any, on the subject is desirable.

Among the findings of the committee it is noted that (1) as a rule, English tenant farmers do not ask for leases but prefer to enter into a contract by which the tenancy can be terminated by the usual 12 months' notice; and (2) there are an abnormal number of estates being broken up and sold. The reason assigned for this latter condition is the feeling of apprehension among the land owners as to the probable tendency of legislation and taxation in regard to land; the belief that land at present is let at rates below its present economic value; and the fact that many agricultural estates are mortgaged and at present prices a sale will often enable the owner to pay off the mortgage and retain an income in excess of what he has been receiving as owner of the estate.

The committee suggests that 2 years' notice instead of one should be required to terminate the tenancy of any agricultural holding, and that a scheme of state-aided purchase should be instituted.

The tenant farmers' grievances, II (*Economist, 74 (1912), No. 3574, pp. 406, 407*).—This article brings out the salient features of the report noted above.

For the best results, should the tendency in Ontario be to group farms into larger ones, to divide them into smaller ones, or to leave them at about their present size? A. G. Mackenzie et al. (*Ann. Rpt. Ontario Agr. and Expt. Union, 32 (1910), pp. 75–78*).—A number of discussions as to what size farms in Ontario will yield the greatest net return are here presented.

The size of farm most generally adopted in ordinary farming is said to be about 100 acres. Arguments are given to show that larger farms would be to the economic advantage of the country, but the consensus of opinion seems to be that 100- or 50-acre farms conduce to larger productiveness, profits, and well-being.

[Farm results for 1910], H. E. Cook et al. (*Univ. Bul. St. Lawrence Univ., 5. ser., 1911, No. 2, pp. 87–107, figs. 4*).—This circular furnishes first-hand knowledge as to the expense of labor and cost of material which has entered into the various products of the farm, dairy, poultry, agronomy, and chemical departments of the State School of Agriculture at Canton, N. Y. Itemized statements as to cost, comparative yields, and profits of the leading crops under various conditions are presented.

A country truckers' association [in Maryland], T. A. Merritt (*Country Gent., 76 (1911), No. 3065, p. 10*).—The object of this association is to regulate the methods of its members in the selling, preparing for market, and shipping of their crops, and other matters of common interest. So far, decided advantages have been achieved in purchasing supplies, but little has been accomplished in the way of marketing crops, this partial failure being attributed to the want of unanimity.

The economic results of the specialist production and marketing of wheat, J. Mavor (*Polit. Sci. Quart., 26 (1911), No. 4, pp. 659–675*).—This article describes at length the incidents to the specialist growth of wheat caused by the enormous European demand and the relatively high price which at present is secured for it. Distinctions are made as to agricultural, industrial, and com-

mercial capital so employed, and the functions of each as they relate to production, storage and distribution of wheat are discussed and illustrated. Other observations are noted pertaining to the mechanism of financing the crop by the farmer, and the various operations affecting the movement of crops by elevator, transportation, and exporting companies. It is noted that the development of the universal wheat market and the commercialization of the financial and industrial operations which constitute crop movement have materially increased the efficiency of agricultural capital and have enabled the farmer to conduct his business on a scale which without these agencies would be impossible.

Among the economic results of the development of specialist wheat production the following phases are more or less discussed: The construction of railways in advance of population into regions known or supposed to be possible wheat-producing areas; the provision of transportation or distributing facilities other than those offered by railways, viz, elevators, docks, steamships, etc.; the influence of the seasonal movement of crops upon the movement of capital; changes in the value of farm lands; increased economic efficiency of agricultural capital; employment during harvest of a number of laborers in excess of those needed during the remainder of the year; the growth of small towns and of a class of small merchants; and the necessity of a reserve fund to insure against fluctuation of prices and variation of climatic conditions.

Floor rules of the Boston Chamber of Commerce (*Boston Chamber Com. Ann. Rpt. 1910, pp. 209–244*).—Rules governing the trade in grain, flour, eggs, butter, cheese, beans, and other produce between members of the Boston Chamber of Commerce are here presented.

Area and production of cereals, 1907–1911, and of flaxseed, 1908–1910, by countries, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 29, pp. 18*).—In addition to the following table showing area and production of 3 of the leading cereal crops of the world, this circular gives similar data for barley, rye, and flaxseed in the countries named below, together with several other countries for a period of years.

Area and production of cereals by countries in 1911.

Country.	Corn.		Wheat.		Oats.	
	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
United States	105,825,000	2,531,488,000	49,543,000	621,338,000	37,763,000	922,298,000
Argentina	7,945,100	27,675,000	15,451,600	145,981,000	1,980,200	47,192,000
Hungary	6,090,400	137,069,000	8,352,600	175,030,000	2,653,300	90,151,000
Italy	3,736,200	93,837,000	11,741,200	192,395,000	1,270,500	40,973,000
Roumania	5,152,400	(a)	4,769,400	93,724,000	991,900	26,222,000
Spain	1,145,100	28,730,000	9,705,800	148,495,000	1,268,400	33,858,000
Canada	316,000	18,767,000	10,374,000	215,851,000	9,219,900	369,949,000
France	(a)	(a)	15,644,800	314,197,000	9,983,100	304,452,000
Germany	.....	.....	4,878,200	149,411,000	10,693,700	530,704,000
England	.....	.....	1,804,000	60,729,000	1,841,100	74,119,000
Australia	.....	.....	7,708,900	98,109,000	676,600	15,914,000

a No official data received.

Agricultural statistics, 1911 (*Bd. Agr. and Fisheries [London], Agr. Statis., 46 (1911), No. 2, pp. 103–177*).—Notes and statistics showing returns of the crops for 1911, together with a comparison of returns for a number of years in Great Britain and the United Kingdom. The following table shows the acreage, yield, and value of several of the leading crops for 1910–11. The value represents the average market prices for the months of September, October, and November of each year, as returned under the corn returns act, and the board's weekly return of market prices.

Acreage, yield, and value of leading crops in 1910–11.

Crops.	1911.				1910.			
	Acreage.	Yield per acre.	Total produce.	Total value.	Acreage.	Yield per acre.	Total produce.	Total value.
	Acres.	*Bu.*	*Quarters.*		*Acres.*	*Bu.*	*Quarters.*	
Wheat	1,906,038	32.87	7,832,171	£12,760,000	1,808,854	30.34	6,859,656	£10,432,000
Barley	1,597,848	31.91	6,373,575	9,826,000	1,728,681	32.67	7,059,013	8,677,000
Oats	3,010,671	37.98	14,294,107	14,056,000	3,020,974	40.33	15,228,625	12,437,000
		Tons.	*Tons.*			*Tons.*	*Tons.*	
Potatoes	571,801	6.69	3,825,312	13,580,000	539,684	6.44	3,477,139	10,692,000
		Cwt.				*Cwt.*		
Hay (clover)	2,074,765	25.18	2,612,532	13,193,000	2,074,579	31.47	3,264,338	13,302,000
Hay (meadow)	5,002,257	18.27	4,569,372	22,276,000	5,004,444	24.99	6,252,292	22,039,000
			Cwt.				*Cwt.*	
Hops	33,056	9.92	328,023	3,428,000	32,886	9.20	302,675	1,589,000

Agricultural and land improvement credit in British India (*Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 11–12, pp. 205–221*).—This article discusses agricultural credit and the success attending the efforts of the Indian government in the way of legislation since 1904 to bring credit facilities within the reach of the small farmer, noting at the same time that the earlier system of direct loans to farmers by the provincial government has continued in force and is providing working capital for the means of effecting permanent improvement for a number of the more well-to-do farmers.

Tables are given showing the classification of loans by provinces, the amount of loans, interest, etc. in 1909–10. The total loans existing at the beginning of the year amounted to 44,835,309 rupees (about $14,524,640); loans granted during the year 7,057,328 rupees; loans abandoned 82,995 rupees; loans recovered 16,876,249 rupees; loans of which recovery was suspended 735,784 rupees; and loans unpaid on maturity 2,826,385 rupees.

[Agriculture in British East Africa], A. C. Macdonald (*Dept. Agr. Brit. East Africa Ann. Rpt. 1910–11, pp. 1–20*).—This report presents general agricultural data, showing that there has been considerable progress along agricultural lines during the last year. There is in general a very hopeful feeling with respect to the agricultural future of the country, this being attributed to a number of causes, among which are noted the large inflow of money for development in many branches of farming; a continued influx of settlers, many possessed of substantial means as well as agricultural experience; an increase in the value of land, exports, imports, etc.; and the formation of numerous companies for the exploitation of various industries.

A noticeable feature shown in the development of agriculture during the year is the increase in the acreage put under rubber, sisal, sem sem, and other tropical crops, and the marked progress in animal husbandry, especially the increase in pure-bred and graded-wooled sheep.

AGRICULTURAL EDUCATION.

Report on the distribution of grants for agricultural education and research in the year 1910–11; with statements respecting the several colleges and institutions aided (*Bd. Agr. and Fisheries* [*London*], *Ann. Rpt. Agr. Ed. and Research, 1910–11, pp. XVI+46*).—This report contains a list of the grants awarded to educational institutions for agricultural instruction in 1910–11 amounting to $91,374, as compared with $59,655 in the previous year. This increase consists of additional aid to institutions previously aided, and

to the Victoria University at Manchester, Oxford University, the Royal Agricultural College at Cirencester, Horticultural College at Swanley, and the Royal Horticultural Society's School at Wisley, which had not received aid heretofore. Additional special grants for experimentation and research to 6 institutions amount to $2,061.25.

Data are summarized as to the occupations of agricultural students in England and Wales after graduation. Of a total of 1,769 students 1,631 returned to occupations connected with the land.

An appendix gives a detailed report for 1909–10, by the superintending inspector, on the staff, equipment, courses of study, fees, students, external work, finances, and publications of the institutions receiving grants.

The present status of horticultural instruction in Belgium [February, 1912], A. Buyssens (*Tribune Hort. [Brussels], 7 (1912), No. 297, pp. 129–132*).—The author gives an account of horticultural instruction as follows:

(1) Horticultural lectures given by local horticultural societies subsidized by the state. These lectures are given on Sundays and are attended by horticultural apprentices, gardeners, and amateurs. In the winter of 1911–12, 2,755 lectures were given in series of 15 lessons and less.

(2) Elementary professional horticultural sections annexed to elementary schools in which the instruction is particularly adapted to the regions, extends through 1 or 2 years, and consists of at least 60 theoretical lessons of 1 hour each on the elements of horticulture, and 30 practicums of 2 hours or less. A certificate is awarded to students passing the final examination. The aid given by the department of agriculture varies from $87 to $164. There are also temporary schools of horticulture in which the staff of instructors is sent from one place to another, continuing in a locality as long as the attendance is good.

(3) Secondary schools of horticulture at Mons, Liege, Carlsbourg, Tournai, Ghent, and Vilvorde. A brief account of the equipment, budget, and instruction in each of these schools is given.

Instruction in alimentary hygiene among the working classes in Germany, F. Kalle (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, p. 134*).—This article is a summary of German progress along the line indicated, the most important element of which has been the extension of teaching of hygiene and home economics in the state schools. Special impetus was given to the movement at its start by ladies of the ruling families and later by national philanthropic organizations of women. At present such instruction is offered in practically all the schools for girls in towns having a population of 10,000 or more, and traveling courses are provided for the village schools in certain districts. There is some effort being made to make courses in home economics compulsory for girls above required school age, but the author thinks it doubtful if this proves feasible.

Higher education in home economics in the United States, C. F. Langworthy and Marie T. Spethmann (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1910), Sect. 7, pp. 113, 114*).—A summary of a paper presented at the Second International Congress of Alimentary Hygiene and the Rational Feeding of Man, Brussels, October, 1910.

Course in domestic science, domestic science division, school of agriculture, University of Minnesota, Juniata L. Shepperd (*2. Cong. Internat. Hyg. Aliment. Bruxelles [Proc.], 2 (1909), Sect. 7, p. 142*).—A summary of a paper presented at the Second International Congress of Alimentary Hygiene and the Rational Feeding of Man, Brussels, October, 1910.

The relation of the teacher to the boys' corn club work, L. N. Duncan and J. B. Hobdy (*Alabama Col. Sta. Circ. 11, pp. 10*).—This circular makes an appeal

to teachers to lend their influence and efforts to encourage corn club work; states the object of the boys' corn club, how the teacher may organize a club, who may become members, and some of the prizes offered in Alabama in 1910; and outlines a suggested constitution and by-laws, means of arousing and holding interest, and some results of the work.

How to organize and conduct a girls' canning club, DELLA STROUD (*Alabama Col. Sta. Circ. 12, pp. 8, figs. 7*).—This circular advises as to the objects of canning club work, why the teacher should be interested, how the teacher may organize a club, who may become members, and results of the work; and outlines a suggested constitution and by-laws.

School gardening, F. E. LLOYD and L. N. DUNCAN (*Alabama Col. Sta. Circ. 13, pp. 27, figs. 7*).—This circular considers school gardening as a factor in education, states how school gardening may be made a part of the course, and what to do with the materials grown in the garden, and gives directions concerning the location and planning of the garden, the necessary tools, a fertilizer test with different crops, individual and home gardens, flowers, hotbeds and cold frames. Suggested plans for general and individual gardens combined, and for the individual plat, as well as planting tables for crops arranged by seasons and for vegetables, are given.

The germination test for seed corn, T. A. KIESSELBACH (*Nebraska Sta. Ext. Bul. 3, pp. 4, figs. 7*).—Simple directions are furnished for a test.

Organization lists of the agricultural colleges and experiment stations in the United States, MARY A. AGNEW (*U. S. Dept. Agr., Office Expt. Stas. Bul. 247, pp. 103*).

MISCELLANEOUS.

Twenty-fourth Annual Report of New York Cornell Station, 1911 (*New York Cornell Sta. Rpt. 1911, pp. CXLIX+793+20+XVI, table 1, pls. 5, figs. 293+10*).—This report contains the organization list, reports of the president of the university, the director of the station, and heads of departments, a financial statement as to the federal funds for the fiscal year ended June 30, 1911, and reprints of Bulletins 284 to 303 and Circulars 8 to 10, previously noted, and Circular 11, noted on page 778 of this issue.

Twenty-fourth Annual Report of Rhode Island Station, 1911 (*Rhode Island Sta. Rpt. 1911, pp. 113–160+VII*).—This contains the organization list, a report of the director on the work of the station during the year, including a summary of meteorological observations of the year abstracted on page 715 of this issue, and a financial statement for the fiscal year ended June 30, 1911.

Twenty-first Annual Report of Washington Station, 1911 (*Washington Sta. Bul. 104, pp. 20*).—This contains the organization list, a report of the work and publications of the station during the year, and a financial statement for the fiscal year ended June 30, 1911.

Report of cooperative and extension work in agriculture in middle Tennessee for the years 1909 and 1910 (*Tennessee Sta., Rpt. Coop. and Ext. Work Agr. Middle Tenn., 1909–10, pp. 93, figs. 8*).—This includes a general report of this work by the director of the station and reprints of Bulletins 92 and 93, previously noted.

Farmers' Day guide to the experiments in progress on the college farm (*Delaware Sta. Circs. 4, pp. 22, pl. 1; 5, pp. 23; 6, pp. 32, pl. 1*).—These circulars, prepared for distribution at the annual Farmers' Day, furnish a key to the experimental plats and live stock in June, 1909, 1910, and 1911, respectively.

List of publications of the Rhode Island Agricultural Experiment Station of the State College, Kingston, R. I., available for distribution December, 1911 (*Rhode Island Sta. Bul. 147, pp. VII*).

NOTES.

California University.—The new agricultural hall is nearing completion. It is a white granite structure of fireproof construction, and will cost about $200,000. The faculty, students, and alumni of the university are planning to erect in the museum corridor of the new building a bronze bust in honor of Dr. E. W. Hilgard, emeritus professor of agriculture.

Georgia University.—The Georgia legislature, at its last session, appropriated $25,000 for establishing and $5,000 for equipping the Agricultural, Industrial, and Normal College at Valdosta, as a branch of the state university. The city of Valdosta has passed an ordinance fixing a tax of one mill on the ad valorem property of the city for a period of 10 years, which will provide an annual income of at least $50,000 to be used for the establishment and maintenance of the college.

This institution will have a relation to the University of Georgia similar to that of the State Normal School at Athens and the Georgia Normal and Industrial College at Milledgeville, and will be similar to these institutions in aims and methods, in that it will be devoted to the training of teachers and, for the present at least, will admit women only.

Illinois University and Station.—W. G. Eckhardt has been granted a three-years' leave of absence to organize extension work in DeKalb County as agricultural commissioner of the county, under the auspices of the recently organized DeKalb County Soil and Improvement Association. A guaranty fund of $10,000 has been raised among the farmers, bankers, and other interests. The county board of supervisors has contributed $2,000 and has authorized the use of the county farm where, as well as on private farms, field demonstrations will be established.

Maine Station.—The station council has been increased by the addition of William H. Davis, representing the State Live Stock Breeders' Association, and W. G. Hunton, president of the State Seed Improvement Association.

Maryland College and Station.—The last legislature appropriated $3,000 per annum for the ensuing biennium for demonstration work by the station. It also enacted several other laws of interest. Among these is a lime inspection law, which is to be administered by the college. The fertilizer law was so revised as to make it conform more nearly to other state fertilizer laws and providing a tonnage tax instead of a brand tax.

A seed inspection law was passed, carrying an appropriation of $2,000 annually. This law is to be administered by the State Board of Agriculture, but as the director of the station is ex-officio secretary of the board and its executive officer, the work will be in close connection with the station.

A state biological laboratory was established for the manufacture of hog-cholera serum and other biological preparations for domestic animals, and for conducting investigations. An appropriation of $10,000 was made for the first year and $5,000 for the second year. The director of the station was made director of the laboratory but the appropriation was to the State Board of Agriculture.

A state drainage law was passed which provides for drainage districts on much the same plan as under the North Carolina law. A loan fund of $10,000 is made available for the purpose.

Dr. B. M. Bolton has been appointed bacteriologist of the station to carry on investigations on poultry diseases.

Mississippi Station.—A. F. Rolf has succeeded W. F. Kirkpatrick as poultryman, and C. F. Briscoe, of the University of Illinois, has been appointed bacteriologist.

Cornell University.—The legislature has made appropriations to the college of agriculture aggregating $907,000, of which $788,000 is made immediately available. Of this amount $329,000 is for the erection of new buildings for the use of the departments of forestry, agronomy, and animal husbandry, $182,000 for the completion of work already under way, and the remainder for current maintenance and similar expenses.

An eight-car agricultural special train, equipped by the college of agriculture, was sent out from April 2 to 12 over the lines of the Delaware and Hudson Railroad Company. One car was fitted up for an exhibition and demonstrations of insect pests and fungus diseases, another for poultry husbandry, a third for home economics and human nutrition, and a fourth for dairying. Half-day or evening stops were made at about 20 localities, and the total attendance approximated 20,000.

Recent appointments include C. G. Woodbury, of Purdue University, as professor of pomology, and Hugh C. Troy as professor of dairy industry. The following promotions are also announced: From assistant professor to professor, J. A. Bizzell in soil technology, W. A. Riley and G. W. Herrick in entomology, H. W. Riley in farm mechanics, and H. E. Ross in dairy industry; from instructor to assistant professor, L. J. Cross in agricultural chemistry, Robert Matheson and George C. Embody in entomology, Arthur L. Thompson in farm management, and Ralph H. Wheeler in extension teaching.

Filibert Roth, whose appointment to the chair of forestry was recently noted, has reconsidered his acceptance and will remain at the University of Michigan where additional facilities for the forestry school are to be provided.

Ohio State University.—A public sheep shearing contest, thought to have been the first of the kind in this country, was held at the university April 5. E. F. Rinehart has resigned as instructor in dairying.

Washington College.—The college has purchased the creamery department of a local bottling works, with equipment consisting of three large cold storage rooms, a manufacturing and ice cream room, machinery, etc. The college will continue to operate the plant and will also install butter making machinery.

Wyoming University.—Dr. C. A. Duniway, of the University of Montana, has been elected president in succession to Dr. Charles O. Merica, whose resignation has been previously noted.

Agricultural Library Section of American Library Association.—The first meeting of this section is to be held in connection with the annual conference of the American Library Association, at Ottawa, June 26 to July 2. The tentative program includes a paper on library extension work of the state agricultural colleges, a discussion of administrative policies in agricultural college and experiment station libraries, descriptions of various types of these libraries, and a symposium on recent reference books and new periodicals.

Pennsylvania Rural Life Conference.—The initial meeting of this organization was held in Philadelphia, March 14 to 16, with President Sparks, of the Pennsylvania State College, as chairman. A large number of speakers were heard, among them Dean Hunt of the Pennsylvania College, A. C. Monahan of the United States Bureau of Education, Dean Bailey of Cornell University,

State Superintendent of Public Instruction Schaeffer, Sir Horace Plunkett, Gifford Pinchot, and representatives of various agencies interested in different phases of rural life.

Agricultural School at San Cristobal, Santo Domingo.—A recent number of *Revista de Agricultura* contains an account by Dr. A. E. Barthe, the director-general of agriculture, of the first year's work of the agricultural school at San Cristobal, which was officially inaugurated April 1, 1911. Of the 30 students in attendance, 6 were admitted to the advanced three-year course, and 20 to the lower two-year course. The advanced course, which leads to the "perito agricola" diploma, or agricultural expert, trains young men for the public service as itinerant instructors in the Provinces under the direction of agricultural inspectors, as agricultural teachers in the schools, directors of large estates, etc. The lower course is a practical course leading to the "jefe de cultivo" diploma.

Poultry School in Mexico.—A practical poultry school has been established at Tacubaya, near the City of Mexico, under the direction of G. G. Prieto. Three courses of three months each will be offered, beginning November 1, February 1, and May 1, respectively. The instruction will be both theoretical and practical and for men and women. Candidates must be 15 years of age and must have completed the primary school or its equivalent.

Practical School of Agriculture in Argentina.—A practical school of agriculture is to be established by the Federal Government on Chavigne Island, opposite Rosario. One hundred hectares of land, part of which is under water, will be available for the school.

Agricultural Instruction in Norway.—In 1910–11 there were 40 elementary agricultural schools with a total attendance of 1,857 pupils. These schools include 8 horticultural schools with an attendance of 94 pupils, 5 forestry schools with an attendance of 95, and 6 dairy and cheese schools with an attendance of 71 pupils. There were also 22 home economics schools with an attendance of 576 pupils.

Agricultural Education in Italy.—By royal decree of December 21, 1911, the higher council of agricultural, industrial, and commercial instruction is abolished, and a council for agricultural instruction substituted. The new council is to consist of fourteen members appointed by the minister of agriculture, and is to give advice regarding proposed legislation and general provisions for agricultural instruction, agricultural schools of any grade, aid to students, and other questions relating to agricultural, forestry, and zootechnical studies which he may refer to it.

Itinerant Instruction in Agriculture in Italy.—A statement is given in a recent number of *Il Coltivatore* showing the amounts appropriated by the State to the various Provinces and by the Provinces themselves for itinerant instruction in agriculture. The largest state appropriation was $3,280 and the smallest, $300; while the largest provincial appropriation was $15,560, the next largest, $6,770, and the smallest, $260.

Practical School of Agriculture in Spain.—A royal decree of February 14 provides for a practical school of agriculture at Palma de Mallorca, Province of Baleares.

Agricultural High Schools in South Australia.—The February number of the *Journal of Agriculture of South Australia* announces that on the advice of the director of agriculture the governor has decided to establish 2 agricultural high schools under the education department, one at North Bundaleer and the other on the Moorak homestead. These schools are to be utilized (1) as preparatory schools to Roseworthy College, (2) for training teachers of primary

schools, especially those located in country districts, in agricultural subjects, and (3) for winter classes for farmers.

A Training Farm for Boys in South Australia.—The minister of industries and agriculture in South Australia has announced that arrangements have been completed for the establishment of a training farm for boys who wish to go on the farm but who have not the means to fit themselves for this work. This farm is to be located at Booborowie. Boys from 14 to 16 years of age are eligible for admission and may stay on the farm for two years or until they are 17 years of age. During this time they will receive an elementary training in all branches of farm work, and will receive a small allowance in addition to board and lodging.

Instruction in the Wool Industry.—A department for special instruction in the wool and sheep industry has been recently added to the curriculum of the Sydney Technical College, New South Wales. The course continues from the first of February to the end of July, and embraces both sheep growing and sheep shearing, and the grading and marketing of the fleece.

Forestry Instruction in South Australia.—The government of South Australia has appointed N. W. Jolly instructor in forestry and has decided to establish a two-year course in forestry to consist of university training, together with practical instruction in the forests for from nine to twelve months. The course will include physics, botany, physiography, biology and entomology, surveying, chemistry, and forestry. A forestry diploma will be awarded to students who pass the examinations in the forest subjects, and they will then become eligible to appointment in the woods and forests department.

Technical Advice in Forestry in England and Wales.—The Treasury, on the recommendation of the Development Commissioners, has sanctioned the payment from the Development Fund of $12,125 annually for three years, beginning October 1, 1912, to be distributed by the Board of Agriculture and Fisheries as grants to two universities and three colleges with forestry departments, to enable them to give technical advice to landowners and others interested in forestry. Thus far these institutions, owing to lack of funds, have given their attention for the most part to the instruction of students in forestry. This appropriation will provide for the salary and traveling expenses of a forest expert or advisory officer.

A number of experimental plats dealing with the thinning, planting, and regeneration of woods are to be established by the board, with the cooperation of landowners, the advisory officers to assist in the selection, treatment, and supervision of these plats. They may undertake a limited amount of teaching on condition that other members of the staff give an approximately equivalent time to advisory work. If it is found desirable an institution may charge a fee not to exceed $5 a day for work in the field.

New Journals.—Two new journals of interest to mycologists have recently made their appearance. *Mycologisches Centralblatt*, published under the direction of Dr. C. Wehmer, is devoted to general mycology, including morphology, physiology, biology, pathology, and chemistry of fungi, and to fermentation and technical mycology. The other publication, *Zeitschrift für Gärungsphysiologie*, is issued under the direction of Dr. A. Kossowicz and is devoted to general, agricultural, and technical mycology. Both journals will publish original articles and also give abstracts of literature published elsewhere.

The State Commission of Horticulture of California is publishing a *Monthly Bulletin*, with E. O. Essig as editor-in-chief. The publication is to be devoted to descriptions, life habits, and methods of control of insects, fungus pests, and noxious weeds and animals, especially in their relations to agriculture and horticulture. The leading article in the initial number is a preliminary report on

investigations of the Mediterranean fruit fly in the Hawaiian Islands, by E. K. Carnes.

The *Vegetable Grower* is a new monthly, published at Chicago. The initial number contains articles by several college and station horticulturists. A column entitled "The Experiment Stations" is to contain brief summaries of publications of interest to vegetable and small fruit growers.

The Chemical World is a monthly journal of chemistry and chemical engineering being published in London under the editorship of W. P. Dreaper, who is also contributing an extended discussion of chemical research and its methods.

Eastern Fruit, a popular monthly journal especially devoted to eastern horticultural interests, is being published at Philadelphia.

The Agricultural Record (London) has been reorganized as *The Journal of Central and Associated Chambers of Agriculture and the Agricultural Record.*

Miscellaneous.—The Southern Commercial Congress is organizing a commission from the various States to visit Europe during the summer for a study of cooperative rural finance. The International Institute of Agriculture at Rome is to be one of the institutions visited on the trip.

In connection with the International Congress of Comparative Pathology, to be held in Paris, October 17 to 23, 1912, a section on plant pathology has been organized under the presidency of L. Matruchot, professor of cryptogamic botany of the Sorbonne. American botanists are invited to attend and to submit papers, the titles of which should be sent to Monsieur D. Brocq-Rousseu, Place Carnot, Nancy, France.

Plans are under consideration for doubling the present size of the school of agriculture of Cambridge University, in order to cope with the increased work entailed by the proposed assignment to the institution of grants from the Development Fund for research in plant breeding and animal nutrition.

Farmer's Advocate announces that the 1912 session of the Manitoba legislature has separated the College of Agriculture of Manitoba from the University of Manitoba, and given it power to confer its own degrees.

Another state school of agriculture has been authorized in New York, to be located on Long Island, with an initial appropriation of $50,000.

The *Canadian Farm* announces that C. C. James, deputy minister of agriculture of Ontario, has been appointed a special commissioner by the Dominion Government to inquire into the question of federal and provincial cooperation in the encouragement of agriculture.

Hugh G. Van Pelt, formerly of the Iowa College, has accepted an editorial position on the staff of *Kimball's Dairy Farmer*, and will be succeeded in the field work of the Iowa State Dairy Association by E. S. Estel.

R. N. Lyne, director of agriculture in Portuguese East Africa, has been appointed director of the new agricultural department in Ceylon.

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Subscription price - - - - $1 per volume.

EXPERIMENT STATION RECORD.

VOL. XXVI. ABSTRACT NUMBER. No. 9.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The chemistry of the proteins, O. COHNHEIM (*Chemie der Eiweisskörper. Brunswick, 1911, 3. ed., rev., pp. XII+388*).—This work (E. S. R., 16, p. 439) has been entirely rewritten, and includes literature up to nearly the end of 1910.

The action of hydrogen peroxid on the autolysis of plant proteins, T. SCHESTOFF (*Trudy Imp. S. Peterb. Obshch. Estestvo. (Trav. Soc. Imp. Nat. St. Petersb.), 41 (1910), I, No. 2–3, pp. 89–100; abs. in Zentbl. Allg. u. Expt. Biol., 2 (1911), No. 5–6, p. 121*).—This work was conducted with a yeast preparation (hefanol), ordinary yeast, and wheat seedlings. It was found that the destruction of catalase by hydrogen peroxid had no influence upon the autolysis of proteins. Hydrogen peroxid stimulates the autolytic process.

The hydrolysis of potato protein, B. SJOLLEMA and I. J. RINKES (*Hoppe-Seyler's Ztschr. Physiol. Chem., 76 (1912), No. 5–6, pp. 369–384*).—One hundred gm. of potato protein, estimated to contain 16 per cent nitrogen, yielded the following: Ammonia, 1.8 gm.; histidin, 2.3 gm.; arginin, 4.2 gm.; lysin, 3.3 gm.; cystin, 4.4 gm.; glutaminic acid, 4.6 gm.; prolin, 3.0 gm.; alanin, 4.9 gm.; leucin, 12.2 gm.; valin, 1.1 gm.; valin+alanin, 8.2 gm.; valin+leucin, 1.9 gm.; phenylalanin, 3.9 gm.; and tyrosin, 4.3 gm.

In regard to casein, G. GNADEBERG (*Milch Ztg., 40 (1911), No. 46, pp. 456–458*).—A description of a method for preparing a faultless acid casein.

The formation of fat in oleaginous fruits, F. SCURTI and G. TOMMASI (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 4 (1909–10), pp. 253–286; Rend. Soc. Chim. Ital., 2. ser., 3 (1911), No. 4, pp. 69–75*).—This is a chemical study of the composition of the wood, leaves, and fruit of the olive tree, including a special study of the fatty substances in the olive gathered during the various periods of ripening.

The immature olives were found to contain an alcohol (waxy) which had the composition $C_{31}H_{50}O_3$. This alcohol was found to begin to diminish as the ripening progressed, with the resulting formation of free fatty acids. When the fruits were ripe it was found that these acids had disappeared and that neutral fats were present instead.

In regard to the formation of fatty acid in oleaginous fruits, F. SCURTI and G. TOMMASI (*Rend. Soc. Chim. Ital., 2. ser., 3 (1912), No. 13, pp. 358–363*).—A continuation of the studies reported above. This work was done with the privet (*Ligustrum vulgare*), and practically confirms the findings with the olive.

Myristone obtained from alfalfa, C. A. JACOBSON (*Jour. Amer. Chem. Soc., 33 (1911), No. 12, pp. 2048–2051*).—From alfalfa (*Medicago sativa*) grown from carefully selected seed and cut during the early blooming period, cured, and dried a ketone was obtained having the formula $(C_{13}H_{27})_2CO$. This compound, which in all probability is myristone, is combined with another substance or substances in the plant. It can be extracted with hot 95 per cent alcohol and isolated by weak nitric acid. Attempts to oxidize the ketone to the corresponding acid were unsuccessful. A secondary alcohol, however, was obtained.

An improved extractor, C. A. JACOBSON (*Jour. Amer. Chem. Soc., 33 (1911), No. 12, pp. 2051, 2052*).—A description of the apparatus used in the above work. The ordinary forms of extraction apparatus found upon the market proved to be inefficient for the purpose.

Alfalfone, a ketone of the formula $C_{21}H_{42}O$, obtained from alfalfa.—Alfalfa investigation, II, C. A. JACOBSON (*Jour. Amer. Chem. Soc., 34 (1912), No. 3, pp. 300–302*).—Continuing the work noted in the abstracts above, the author reports extracting a ketone from the heavy green precipitate obtained from alfalfa by extraction with 95 per cent alcohol. The name given to this ketone, which is a white, amorphous powder, having the formula $C_{21}H_{42}O$, is alfalfone. Two samples of alfalfone purified with petroleum ether gave a melting point varying between 88.5 and 88.8° C.

"Alfalfone is insoluble in water, hot and cold acetone and ether, insoluble in cold alcohol, but dissolves slightly when this solvent is heated to boiling. Chloroform and carbon disulphid dissolve it to some extent in the cold but easily on warming. . . . Alfalfone manifests the same electrical properties as the myristone with which it is associated in alfalfa. It gives negative tests with bromin for unsaturation, with ferric chlorid and alkali for phenolic character, and with acetic anhydrid for hydroxyl. It does not give the characteristic color reactions for the cholesterol group. Its chloroform solution does not show any absorption bands either in the visible or ultraviolet part of the spectrum. It is neutral to litmus and phenolphthalein. Continuous extraction of alfalfa for several months was necessary before enough of this material could be obtained to work with, as the yield is only a small fraction of 1 per cent. . . .

"Like myristone, this ketone did not yield an acid (at least not to any appreciable extent) when oxidized with a chromic-sulphuric acid mixture, but when it was heated with a large excess of sodium in 95 per cent alcohol, the corresponding carbinol was obtained whose properties differ somewhat from the mother substance. . . . Not enough material was available for determining the location of the carbonyl group in the ketone or the hydroxyl in the carbinol."

Saccharification of inulin by the ultraviolet rays, L. MASSOL (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 13, pp. 509–511*).—The ultraviolet rays were found to saccharify inulin with the production of levulose and dextrose. Levulose was produced in excess.

Chemical composition of some higher fungi, A. GORIS and M. MASCRÉ (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 22, pp. 1082–1084; abs. in Jour. Chem. Soc. [London], 102 (1912), No. 591, II, p. 79*).—Fungi such as *Lactarius piperatus*, *Psalliota campestris*, and others were included in this study.

Carbamid, the author concludes, is not invariably present in the higher fungi, the extent to which it occurs depending upon the season and mode of cultivation. Two cholesterols were isolated from fungi of different species, and a new compound, apparently not a cholesterol, was found.

Chemistry and biochemistry of lipoids, I. BANG (*Chemie und Biochemie der Lipoide. Wiesbaden, 1911, pp. XI+187*).—The first part of this book deals with the general chemistry of the lipoid substances, fats, cholesterols, phos-

phatids, and cerebrosids, and the second part with the biochemistry of these bodies.

Lipase produced by microbes, N. L. SÖHNGEN (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 13 (1911), pt. 2, pp. 1200–1210, pl. 1, fig. 1*).—It was found that the composition of the medium was of no consequence as far as the secretion of lipase by various lipolytic micro-organisms was concerned. Therefore, every source of carbon and nitrogen which can be utilized will serve as a producer of lipase. Acids secreted by microbes will, however, diminish the secretion of lipase. Hydroxyl ions accelerate the activity of the lipases, while hydrogen ions check it.

"Calcium and magnesium ions favor the action of lipase; likewise trimethylamin and sodiumglycocholate; monovalent alcohols counteract the process, sugars and glycerin exerting no influence. Presence of oxygen and light favor the decomposition of fat by the action of lipase. By means of microbic lipase fat may be synthetically obtained. From oleic acid and glycerin chiefly the monoglycerid results, but besides, probably a little di- and tri-glycerid. Microbic lipase shows great similarity to liver and pancreatic lipase."

In regard to the physiology of plant catalase, B. PREOBRASCHENSKY (*Trudy Imp. S. Peterb. Obshch. Estestvo. (Trav. Soc. Imp. Nat. St. Petersb.), 40 (1909), I, No. 1, pp. 276–287; abs. in Zentbl. Allg. u. Expt. Biol., 2 (1911), No. 5–6, p. 121*).—Substances such as acid sodium and potassium phosphates, which stimulate alcoholic fermentation, also increase the catalytic power, while those which inhibit alcoholic fermentation also inhibit catalytic activity. Catalase is therefore active in anaerobic processes. The work was conducted with zymin and wheat seedlings.

Note on a peptid-splitting enzym in woman's milk, L. M. WARFIELD (*Jour. Med. Research, 25 (1911), No. 1, pp. 235–237*).—Human milk was found to contain a ferment capable of splitting the dipeptid glycyltryptophan. This enzym was quickly destroyed by acidity, but an amount of formaldehyde capable of inhibiting bacterial growth, or pasteurizing at a temperature of 60° C., will not destroy it.

The separation of rennin and pepsin by the passage of a direct electric current, W. E. BURGE (*Amer. Jour. Physiol., 29 (1912), No. 3, pp. 330–334, fig. 1*).—The results indicate that in a solution containing both rennin and pepsin the passage of a direct electric current of 10 milliamperes for 25 hours will destroy all the peptic power, while the rennetic action is apparently unchanged.

Effect of ignition on solubility of soil phosphates, G. S. FRAPS (*Jour. Indus. and Engin. Chem., 3 (1911), No. 5, p. 335*).—It is a well-known fact that the ignition of soil samples will increase the amount of phosphates soluble in an acid solution. This author has, therefore, investigated Stewart's method (E. S. R., 23, p. 423) for estimating the organic phosphorus in the soil.

He found that "ignition increases about 10 times the solubility of the phosphoric acid of wavellite, dufrenite, and variscite in fifth-normal nitric acid. Ignition renders variscite, dufrenite, and wavellite almost completely soluble in 12 per cent hydrochloric acid. Ignition of the soil will probably render inorganic phosphates soluble in acid, and therefore is not a method for estimating organic phosphoric acid. Ignition of the soil also renders considerable quantities of iron and aluminum oxids soluble in acid."

The determination of nitrogen in commercial ammoniates of high nitrogen content, C. H. JONES ET AL. (*Jour. Indus. and Engin. Chem., 3 (1911), No. 9, pp. 691–699*).—This is the first report of the committee on nitrogen of the division of fertilizer chemists of the American Chemical Society. It gives the results for moisture by the vacuum and usual methods, and for nitrogen by the Kjeldahl with permanganate, Kjeldahl without permanganate, Kjeldahl-Gun-

ning with permanganate, Gunning, Kjeldahl-Gunning, Gunning with copper sulphate, and Kjeldahl with copper sulphate, reported by 48 cooperating laboratories.

The agreement obtained between the results of moisture determinations was found to be much inferior to that obtained in the determination of nitrogen.

Analysis of calcium cyanamid, H. KAPPEN (*Chem. Ztg., 35 (1911), No. 104, pp. 950–952; abs. in Analyst, 36 (1911), No. 428, pp. 560, 561*).—No difference in the results was noted in determining nitrogen by the ordinary Kjeldahl method as compared with the results obtained after adding zinc dust and salicylic acid or sodium thiosulphate and salicylic acid. Adding water to the material before adding the sulphuric acid was also found to have no effect upon the results. The author, therefore, concludes that commercial calcium cyanamid "yields all its nitrogen as ammonia when 0.5 gm. is digested with 30 cc. sulphuric acid."

For estimating cyanamid nitrogen when distinguishing this from total nitrogen the author employs a modified Perotti method (E. S. R., 21, p. 419).

See also the work of Dinslage (E. S. R., 26, p. 606), Stutzer (E. S. R., 25, p. 805), and Monnier (E. S. R., 26, p. 109).

Detection and determination of cyanamid in the presence of other fertilizing materials, L. VUAFLART (*Ann. Falsif., 4 (1911), No. 32, pp. 321–324*).—The presence of calcium cyanamid in a mixture containing other fertilizers can be detected by its odor, alkaline reaction, the large amount of calcium present, the black residue which is left after treating the sample with water, and the yellow precipitate obtained with silver nitrate which is insoluble in ammonium hydroxid but soluble in nitric acid. An impurity often present in the latter is a black acetylene silver insoluble in nitric acid. If organic fertilizers are present in the mixture these can be detected by dissolving the cyanamid in hydrochloric acid, when the organic matter will remain behind as a black residue. Sulphuric acid added to such fertilizers will yield a brown solution.

For the determination of total nitrogen in such materials the Kjeldahl method can be employed, while the cyanamid and dicyanamid present as such may be estimated with Brioux's modification of Caro's method (E. S. R., 24, p. 623). The method does not furnish accurate results when other fertilizing materials, such as dried blood, are present.

International conference on food analysis (*Analyst, 36 (1911), No. 428, pp. 536–539*).—The recommendations of the international conference at Paris, June 27, 1910, together with the rules proposed for the unification of the expression of analytical results, are presented in detail.

Use of triketohydrindene hydrate for the detection of proteins and their derivatives, E. ABDERHALDEN and H. SCHMIDT (*Hoppe-Seyler's Ztschr. Physiol. Chem., 72 (1911), No. 1–2, pp. 37–43; abs. in Analyst, 36 (1911), No. 427, p. 514*).—Triketohydrindene hydrate was found to yield a blue coloration with α-amino acids, polypeptids, peptones, and proteins. Exceptions to this are prolin, hydroxyprolin, and pyrrolidon carboxylic acid. "For carrying out the test a solution of 0.1 gm. of the reagent in 300 cc. of water is employed; 1 to 2 drops of this reagent are added to 1 cc. of the liquid to be tested, and the mixture is heated to boiling. The liquid to be tested must have a neutral reaction."

The determination of starch, W. GREIFENHAGEN, J. KÖNIG, and A. SCHOLL (*Biochem. Ztschr., 35 (1911), No. 3–4, pp. 194–216*).—The polarimetric methods of Lintner (E. S. R., 20, p. 1008; 21, p. 611; 23, p. 708) and Ewers (E. S. R., 21, p. 108) can be employed for all varieties of starch. The specific rotation for the different starches with the Lintner method is fairly uniform and is on the average +202°. With the Ewers method it is very variable, but for corn,

rice, wheat, rye, barley, and oats can be taken as 183 or 183.4°. Before saccharification the authors advise, when examining feeding stuffs or other starch-containing materials with the polarimetric method, washing these samples with water, alcohol, and ether for the purpose of removing foreign substances which may be optically active. The polarimetric method can also be employed for cacao, cinnamon, pepper, etc. See also previous notes (E. S. R., 22, pp. 111, 306; 24, p. 11).

Determination of gelatin, W. GREIFENHAGEN, J. KÖNIG, and A. SCHOLL (*Biochem. Ztschr., 35 (1911), No. 3–4, pp. 217–227*).—The authors point out that the Beckmann method for the determination of gelatin does not yield results which are of practical value. They find that the Vamvakas method, in which the gelatin is precipitated with Nessler's reagent in an acid solution, will yield quantitative results for gelatin, but a separation of gelatin from proteoses when the latter are present is not possible. Proteoses are not precipitated quantitatively, but the method can be employed as a qualitative test. An excess of trichloracetic acid, as employed by Obermayer, yields only a turbidity in dilute gelatin solutions, and also does not precipitate the proteoses quantitatively. Corrosive sublimate produces no precipitate in a neutral solution of gelatin, but yields a precipitate of proteoses.

Nothing more than the approximation of the gelatin content of jellies, marmalades, etc., can be expected from the above-mentioned methods.

Advances made in the chemistry of bee honey during 1911, A. HASTERLIK (*Leipzig. Bienen Ztg., 27 (1912), No. 2, pp. 19–23*).—A review of the literature.

The detection of olive husks in pepper, C. V. GAROLA and V. BRAUN (*Ann. Falsif., 4 (1911), No. 35, pp. 467–469, figs. 2*).—A discussion of methods, with particular regard to the use of the polarizing microscope for detecting adulterations in pepper.

Determination of tartaric acid in cider, perry, vinegar, etc., A. KLING and L. GILBERT (*Ann. Falsif., 4 (1911), No. 30, pp. 185–192*).—Two ciders examined by this method (E. S. R., 23, p. 418) showed 4.02 per cent and 3.22 per cent of tartaric acid respectively. Of 2 perries 1 gave a negative result, while the second contained 1.97 per cent of tartaric acid. The results obtained in most instances were higher than those obtained with the ether-alcohol method. The method can also be applied to the examination of vinegar and kindred products (see below).

Estimation of tartaric acid in apples, pears, cider, and perry, G. WARCOLLIER (*Ann. Falsif., 4 (1911), No. 35, pp. 485–490; abs. in Analyst, 36 (1911), No. 428, pp. 545, 546*).—The author sought to apply the Kling method to the estimation of tartaric acid in apples and pears and their products. Neither the apple, pear (ripe or unripe), nor the cider or perry therefrom showed a trace of tartaric acid.

Kobert's reagent as a test for salicylic acid, J. MCCRAE (*Analyst, 36 (1911), No. 428, pp. 540, 541*).—This reagent, which consists of 3 drops of formaldehyde solution in 3 cc. of sulphuric acid, when added to salicylic acid or its salts, gives a rose-red coloration. The color, however, does not appear immediately. The same result is obtained with aspirin (acetyl-salicylic acid) and salol, but in the case of the latter the color develops much more quickly.

"Kobert's reagent gives the following characteristic colors with other substances: Phenol, red-violet; catechol, violet (redder than the morphin color); resorcinol, deep orange-brown; quinol, dirty greenish-brown; pyrogallol, brown; α-naphthol, dirty green; β-naphthol, dirty brown; cinnamic acid, brown; mandelic acid, yellow."

[Analysis of milk and wine] (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 2 (1911), No. 7, pp. 425–480*).—This is a description of the revised

methods for analyzing milk and wine which are recommended for introduction into the Swiss food book.

The determination of total solids in milk, P. POETSCHKE (*Jour. Indus. and Engin. Chem., 3 (1911), No. 6, pp. 405–408, figs. 3*).—In this article is described the Deghuée lactometer, which possesses an advantage over the New York Board of Health lactometer and the Quevenne hydrometer in that it requires only 4 oz. of milk for each determination.

In addition, the author describes a pipette which will deliver exactly 5 gm. of milk of a known specific gravity, and which for convenience sake is graduated in the degrees of the New York Board of Health hydrometer. The pipette can be used to good advantage for determining nitrogen by the Kjeldahl process and total solids. It will not yield good results with sour milk.

The determination of moisture in butter, J. C. BRÜNNICH and F. SMITH (*Queensland Agr. Jour., 28 (1912), No. 1, pp. 9, 10*).—This is a comparative study of the rapid factory method of drying in a metal dish over an alcohol flame and the laboratory procedure in which the drying is done in a steam bath on pumice stone. In the first method "the sample, consisting of approximately 5 gm., is placed in a shallow metal dish with a glass rod, and heated on a wire gauze over the flame of a spirit lamp. During heating the sample is constantly stirred, and the dish is removed from the flame after active frothing has ceased, and immediately the curd becomes a rich brown color."

The authors also sought to determine whether the presence of boric acid in butter would affect the results obtained with the usual laboratory method. "The conclusion reached is that the percentages of water found by drying on pumice in the steam bath are but inappreciably affected by the presence of boric acid; whereas, where the volatilization of water is assisted by the addition of alcohol (a rapid method occasionally recommended), boric acid is largely expelled and is calculated as moisture."

Investigations concerning the Reichert-Meissl number and the relation of butter fat constants in butter analysis, O. F. HUNZIKER (*Indiana Sta. Rpt. 1911, p. 34*).—Variations in the time of saponification from 15 minutes to 2.5 hours were without effect upon the Reichert-Meissl number, contrary to the findings of Delaite and Legrand (E. S. R., 18, p. 309).

"The rate of distillation of the volatile acids was also investigated. Fifteen and six-tenths per cent of the total volatile acids were distilled in the first 10 cc. of distillate. The eleventh fraction of 10 cc. distillate contained only 3 per cent of the total volatile acids. Eighty-six per cent of the total volatile acids were distilled over by the Reichert-Meissl process."

Report to the Local Government Board by G. W. Monier-Williams on analyses and methods of detection of certain proprietary substances sold as preservatives for milk, cream, etc. (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. scr., 1912, No. 60, pp. 7*).—"Mystin," which is a preservative recently introduced into England, was found to have the following composition: Sodium nitrite 9.85 per cent, formaldehyde 0.3 per cent, and water 89.85 per cent. Its specific gravity was 1.067 at 17° C.

The claim is made for this preparation that it can not be detected by chemical methods. On account of the large percentage of sodium nitrite the ordinary Hehner test, which is the one usually employed for detecting formaldehyde, is inhibited. It was found, however, that if "5 cc. of milk to which 'mystin' has been added are treated with 0.05 gm. of urea (0.25 cc. of a 20 per cent solution) and 1 cc. of normal sulphuric acid, heated in a boiling-water bath for 2 minutes, and cooled, the resulting liquid gives a well-defined Hehner reaction. The

formaldehyde may be estimated with a fair approach to accuracy by Shrewsbury and Knapp's method."

Some other proprietary preservatives are also considered.

The estimation of lime and potash in the ash of cereals, F. THOMPSON and H. H. MORGAN, Jr. (*Jour. Indus. and Engin. Chem., 3 (1911), No. 6, pp. 398–400*).—Analyzing the ash in corn and wheat by the official method (E. S. R., 20, p. 512) was found to yield unsatisfactory results, and existing methods were also found not rapid enough. Methods were therefore devised for calcium oxid and potassium oxid.

For calcium oxid the following method is recommended: "Fifty cc. of the hydrochloric acid solution of the ash, corresponding to 0.5 gm., are heated to boiling, made slightly ammoniacal, and then acidified again with acetic acid, adding about 10 cc. of 50 per cent acetic acid in excess, making the total volume not more than 75 cc. The precipitate is boiled for a few minutes, allowed to settle, and the combined phosphates of iron and aluminum filtered off and washed thoroughly with hot water. Since this precipitate is usually very small a reprecipitation has not been found necessary. About 10 cc. of saturated ammonium oxalate solution are added to the filtrate while still hot and the CaO determined in the usual way, either by ignition or titration with permanganate."

The method for potassium oxid consists in neutralizing the hydrochloric acid solution containing 0.5 gm. of ash with sodium hydroxid acidifying again with acetic acid, boiling "the solution, and washing the precipitate of iron and aluminum phosphates filtered off thoroughly with hot water. The filtrate is concentrated to about 75 cc. and allowed to cool. Twenty-five cc. of cobaltinitrite solution, made according to the method of Adie and Wood (E. S. R., 12, p. 18), is now added. After standing over night at the room temperature the material is filtered on an asbestos felt in a Gooch crucible, and washed several times with cold 10 per cent acetic acid and finally once with cold water. The asbestos and the precipitate are transferred with water to a small beaker, and 40 cc. of a saturated $Ba(OH)_2$ solution added and heated to boiling, when a copious precipitate of cobaltic hydroxid will be formed. The precipitate is allowed to settle and while still hot filtered into a 200 cc. graduated flask, washing thoroughly with hot water, cooled, and made up to 200 cc.

"Measure off 25 cc. of standard permanganate solution into a casserole, add 5 cc. of 1:1 H_2SO_4 and 150 cc. of hot water and run in the alkaline nitrite solution slowly from a burette until the color disappears.

"On the basis of the formula $K_2NaCo(NO_2)_6,H_2O$, 1 cc. of tenth-normal permanganate is equivalent to 0.000785 gm. K_2O. It has, however, been found to be more convenient to use a permanganate solution of such strength that 1 cc. is equivalent to 1 mg. of K_2O, which would be 0.1274 normal."

Determination of starch in brewers' grains, C. KREUZER (*Ztschr. Gesam. Brauw., 34 (1911), Nos. 23, pp. 277–280; 24, pp. 290–293; abs. in Analyst, 36 (1911), No. 427, pp. 500, 501*).—As none of the methods so far published gives an accurate determination of the amount of starch present in brewers' grains, the author proposes the following one for this purpose:

"An average sample of the grains is ground as finely as possible in a Seck (cutting) mill, and 2.5 gm. of the powder are mixed thoroughly with 10 cc. of water. Twenty cc. of sulphuric acid of specific gravity 1.7 are then added, with stirring, and, after the lapse of 15 minutes, the mixture is rinsed into a 100 cc. flask with sulphuric acid of specific gravity 1.3, this acid being used to dilute the whole to a volume of 100 cc. after 5 cc. of an 8 per cent phosphotungstic acid solution have been added. The contents of the flask are now shaken, filtered through a double filter, and 50 cc. of the filtrate are cooled in a stop-

pered 200 cc. flask to a temperature of 0° C. Five cc. of hundredth-normal iodin solution are then added, the mixture is shaken, again cooled in ice water, 100 cc. of petroleum spirit cooled to 1° C. are added, the contents of the flask are shaken for 1 minute, cooled in ice water, and the excess of iodin is then estimated by titrating 50 cc. of the petroleum spirit with hundredth-normal thiosulphate solution, starch solution being added as an indicator toward the end of the titration. The amount of iodin which has combined with the starch in the grains may then be calculated, and from this the quantity of starch present is obtained, 1 cc. of hundredth-normal iodin solution corresponding with 0.025 gm. of starch.

"The author finds that brewers' grains of various origin contain from 0.99 to 4.8 per cent of starch."

Notes on investigations on some South African tobaccos, M. LUNDIE (*So. African Jour. Sci., 8 (1912), No. 6, pp. 186–191*).—After discussing the cultivation of tobacco in South Africa, the author gives the results of analyzing some African tobaccos, as follows: Virginia leaf (Hester), flue-cured Rhodesian grown, 2.14 per cent nicotin and 12.15 per cent ash; Turkish tobacco (Rhodesian grown), 2.52 per cent nicotin and 10.25 per cent ash; Pondo tobacco (Elliotdale district, Pondoland), 1.45 per cent nicotin and 14.58 per cent ash; Kafir tobacco (Willowvale district, Transkei), 1.13 per cent nicotin and 14.26 per cent ash; Karoo tobacco (Oudtshoorn), 4.92 per cent nicotin and 19.16 per cent ash; and Cango tobacco (Oudtshoorn), 1.44 per cent nicotin and 12.02 per cent ash.

The following method was used in the investigation: "The tobacco leaves are first dried at a temperature of between 60 and 70°, or in a desiccator, to remove all moisture. The ribs are then removed and the leaves crushed in a mortar to a fine powder. Twenty gm. of this fine tobacco powder are weighed out in a porcelain dish, 10 cc. of the sodic hydrate solution added (6 gm. of solid sodic hydrate dissolved in 40 cc. of water and filled up to 100 cc. with alcohol of 96 per cent volume), and the contents of the dish mixed, transferred to a Soxhlet apparatus, and the nicotin extracted by means of ether. This is allowed to continue for about 2 hours, when all the nicotin contained in the 20 gm. taken will be in solution in the ether. The ether is recovered by attaching the flask of the Soxhlet apparatus containing the nicotin in ether to a long Liebig condenser and distilling over the ether. The residue in the flask will be the nicotin, chlorophyll, etc. (The ether may also be expelled by placing the flask in a water bath previously heated to about 50° C. and placed at a safe distance from any flame. Even the hot sun suffices to drive off the ether.)

"To the residue in the flask add 50 cc. of sodic hydrate solution made by dissolving 6.4 gm. of solid sodic hydrate in 100 cc. of water. Attach to this flask a cork with a glass inlet connected to a boiler, and the outlet to a Liebig condenser, and hence distill over the nicotin until the distillate measures 500 cc. . . . Remove 100 cc. of this by means of a pipette into a clean beaker, and titrate by means of a deci-normal solution of sulphuric acid, using cochineal as indicator, until violet-blue turns onion-red. . . . Repeat, using 100 cc. each time, and take the average number of cubic centimeters of deci-normal sulphuric acid used. Let x=average number of cubic centimeters used for each titration. Then $x \times 0.0162 \times 25$=percentage of nicotin."

A comparison is made with the tobaccos grown in the West Indies and in North America.

Qualitative reactions of the vegetable tannins, E. STIASNY and C. D. WILKINSON (*Collegium, 1911, Nos. 475, pp. 318–324; 476, 325–332; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 19, pp. 1172, 1173*).—A discussion of methods.

The qualitative analysis of the tannins, U. J. THUAU and P. DE KORSAK (*Collegium, 1911, Nos. 468, pp. 258–260; 469, 262–265; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 19, pp. 1173, 1174*).—A study of methods.

The chemistry of the urine, W. AUTENRIETH (*Die Chemie des Harns. Tübingen, 1911, pp. XII+344, figs. 28*).—This book, which is prepared for students, physicians, druggists, and chemists, states in a clear and concise way the methods of urine analysis, and gives detailed descriptions of the constituents of the urine under normal and pathological conditions.

Report from the analytical department for 1909–10, J. GOLDING (*Midland Agr. and Dairy Col. Bul. 10, 1909–10, pp. 93–103*).—Analyses are reported of linseed cake, undecorticated cotton cake, soy cake and meal, compounded cakes and meals, offals, fertilizers, etc.

Comparison of results obtained by maceration and diffusion of sugar beets for the production of alcohol, L. AMMANN (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 5, pp. 294, 295*).—The figures show that good results can be obtained by both the maceration and diffusion processes. The diffusion process, however, is more rapid and best suited for large plants, while the maceration process is the one to be preferred for smaller factories.

Grape vinegar, F. T. BIOLETTI (*California Sta. Bul. 227, pp. 337–366, figs. 8*).—This bulletin gives an exposition of the manufacture of vinegar from grapes. The contents include discussions of definitions and standards; classes of vinegar and raw materials; wine vinegar; alcoholic and acetic fermentations; yield of vinegar; processes of manufacture—domestic methods, industrial methods, and the rapid or German process; after treatment—clearing, decoloration, pasteurizing, aging, fining, filtering, and bottling; vinegar diseases; an outline of the operations of vinegar making; and tests of use to vinegar makers for sugar, alcohol, and acid.

Some experiments are also included which have for their object to show that the 2 fermentations, alcoholic and acetic, can not profitably go on at the same time. Where conditions unfavorable to the yeast exist the acetic-acid bacteria gain the upper hand and produce acetic acid, which checks the activity of the yeast, thus allowing much sugar to remain untransformed.

"Acetic acid in quantities approaching 0.5 per cent interferes with the work of the yeast and at 1 per cent stops it entirely."

"Under favorable conditions vinegar bacteria will attack sugar and produce acetic acid directly."

Products of the soy bean (*Pure Products, 8 (1912), No. 3, pp. 157–160*).—In this article the following topics are considered: Vegetable cheese, condensed vegetable milk, and soy sauce or fermented soy.

The potato-flour industry of Germany (*Jour. Roy. Soc. Arts, 60 (1912), No. 3092, pp. 416, 417*).—This article discusses the present status of this industry in Germany, and gives a brief résumé of the methods utilized in preparing this product.

METEOROLOGY—WATER.

Forecasting weather, W. N. SHAW (*London, 1911, pp. XXVII+380, pls. 9, figs. 158; rev. in Nature [London], 88 (1912), No. 2209, pp. 575–577*).—This book is based mainly upon the 11 years' experience of the author as director of the British Meteorological Office, and as such responsible for its forecasting work. It embodies the results of the most recent research in meteorology, and contains a definite formulation of results of investigation by the author and his associates of the meteorological office.

The book deals with the subject of weather forecasting largely from the point of view of experimental physics. The difficulty of such a presentation of the subject on account of the lack of uniformity in units of measurement commonly in use is pointed out, and the author describes and suggests the use of a modified C. G. S. system of meteorological units, although these are not used in the book.

The first chapter explains and illustrates the construction of synoptic charts and their use in forecasting. Then follow discussions of the relation of wind to pressure, Abercromby's views of the order of weather changes in a cyclone, types of weather, and local weather in relation to weather types.

The next 3 chapters deal, respectively, with physical processes of weather, life history of surface air currents, and the minor fluctuations of pressure, embodying more particularly results of investigations made by the author and his associates. The succeeding chapters deal "with special departments of the work of forecasting, such as gales and storm warnings, anticyclonic weather, land and sea fogs, night frosts, colliery warnings, and forecasts for aeronauts.

"These are followed by a consideration of recent developments of the practice of forecasting by the use of weather charts as exhibited by the work of Ekholm upon isallobaric charts and that of Guilbert on the approach of depressions and local deviations from the 'normal' wind. A chapter has been devoted to statistical methods for long-period and seasonal forecasts."

The final chapter discusses the practical utility of the system of weather forecasting in use in the British Meteorological Office. In this chapter stress is laid upon the necessity for trained intelligence and more knowledge of meteorology on the part of the public in order that the greatest benefit may be derived from weather forecasts. Particular attention is also called to the efforts of the meteorological office to improve and increase the use of forecasts of special value to agriculture—the so-called harvest forecasts.

The economic climatology of the coffee district of São Paulo, Brazil, R. DEC. WARD (*Bul. Amer. Geogr. Soc., 43 (1911), No. 6, pp. 428–445, fig. 1*).—This district is described, and it is stated that it is singularly favorably situated with regard to climate, having abundant and well-distributed rains in summer during the growing season of the coffee and dry weather in winter during the harvesting and curing of the product. On account of the relatively high altitude the temperatures are not high enough to make shading of the young coffee plants necessary, and while damaging frosts occur, on the average, every 5 or 6 years the danger from this source is said to have been greatly exaggerated.

It is stated that the district "comes within Köppen's 'subtropical belt of the temperate zone,' whose characteristics are that 4 to 11 months are 'hot' (mean temperature over 68°) and 1 to 8 months are 'temperate' (50 to 68°). The mean annual temperatures average between 65 and 70°. January is usually the warmest month and June the coolest. The ranges, annual, monthly, and diurnal, as a rule, increase inland. The mean annual ranges in the coffee country average from 12 to 15°. In summer the thermometer may rise to near, or even above, 100°. The extremes of summer heat are brought by northwesterly winds from the interior, which are also extremely disagreeable."

The annual rainfall of the district averages between about 45 and 60 in., being heaviest on the coast (about 90 in.) and lower (about 50 in.) at the higher interior points.

The relation of the climatic conditions to the culture of coffee is discussed. The planting of shade among the older plants is the only means employed for protection against excessive heat or frost.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and R. N. HALLOWELL (*Massachusetts Sta. Met.*

Buls. 277, 278, pp. 4 each).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during January and February, 1912, are given. The data are briefly discussed in general notes on the weather of each month.

Report of the water resources investigation of Minnesota, 1909–10, G. A. RALPH and R. FOLLANSBEE (*Bien. Rpt. State Drainage Com. Minn., 1 (1909–10), pp. 347, pls. 18+51*).—This report on the water resources of Minnesota combines the report of the State Drainage Commission and that of the U. S. Geological Survey. The report of the State Drainage Commission contains measurements of flow in most of the important streams of the State, evaporation records from 5 stations in the Minnesota neighborhood, data relative to power development and the regulation and control of water resources in other States and foreign countries, a map showing the distribution of rainfall throughout the State, and the draft of a proposed law for the establishment of a water supply commission to regulate and control the use of the waters of the State. The report of the Geological Survey contains data from the investigation of the water supply of the State, from surveys relative to the fall of the streams, and on drainage, rainfall, evaporation, developed and undeveloped water power, and water storage.

Accompanying these reports, under separate cover, is a set of plates containing topographical maps and profiles of about 1,000 miles of streams. The topographical maps show the true stream courses, the mean water elevations, the complete topography of the stream basins, and the locations relative to township and section lines. The profiles show the fall of the streams in feet per mile. The information contained in these plates shows the possibilities for power development, drainage outlets, flood prevention, and navigation.

Pond fertilizing experiments, KUHNERT (*Deut. Landw. Presse, 39 (1912). Nos. 11, pp. 115–117, figs. 4; 12, pp. 128, 129; 13, pp. 140–142*).—Experiments with various fertilizing materials to increase the growth of food plants in fish ponds are reported, showing as a rule a profitable return from such fertilizing.

SOILS—FERTILIZERS.

Surface geology of the Northern Peninsula of Michigan, F. LEVERETT (*Mich. Geol. and Biol. Survey Pub. 7, Geol. Ser. 5, 1910, pp. 91, pls. 8, figs. 7, map 1*).—This report, which was prepared in cooperation with the U. S. Geological Survey, includes studies of the physiography, glacial, and lake features, climatic and agricultural conditions, water power, and water supply of the region.

The glacial drift is deposited irregularly over all the rock formations of the peninsula, the most prominent of the features of the drifts being moraines. These areas have a prevailing loose texture deposit. About 30 per cent of the region is sandy till and 12 per cent a clay till.

A preliminary study of soils of Mississippi, E. N. LOWE (*Miss. Geol. Survey Bul. 8, 1911, pp. 220, pl. 1, figs. 23*).—This bulletin is preliminary to the detailed county soil reports made in cooperation with the Bureau of Soils of this Department.

The bulletin outlines in some detail the nature, origin, and formation of soils, their preparation and crop adaptation, and reports results of a study of the geological structure and physiographic regions of Mississippi. A chapter on soil erosion and analyses of typical soils is given in an appendix, the mechanical analyses being made by the Bureau of Soils and the chemical analyses compiled from reports by E. W. Hilgard and made by the state university.

The topographic regions of the State are discussed with reference to their extent, soil characteristics, vegetation, state of cultivation and crops raised, and water supply.

Bibliography of Tennessee geology, soils, drainage, forestry, etc., ELIZABETH COCKRILL (*Tenn. Geol. Survey Bul. 1, Extract B, 1911, pp. 119*).—This contains a list, with subject index, of the available reports and papers published on the geology, soils, drainage, and forestry of Tennessee, also a list of publications of the State Geological Survey.

Reconnoissance soil survey of part of northwestern Wisconsin, S. WEIDMAN, E. B. HALL, and F. L. MUSBACK (*Wis. Geol. and Nat. Hist. Survey Bul. 23, 1911, Econ. Ser. 14, pp. VIII+102, pls. 14, figs. 16, map 1*).—The results of a survey of the geological formations, combined with a study of the soils and the climatic and agricultural conditions of the region, including Eau Claire, Chippewa, Rusk, Barron, Dunn, Pepin, Pierce, St. Croix, and Polk counties, and covering an area of 6,705 square miles, are reported.

The region is well watered. The soils are classed on the basis of texture into 14 types which are mapped and described with respect to area, surface features, forest growth, general character and origin, crop adaptation, and value. They include the Baldwin loams, Colby silt loam, Kennan silt loam, Chelsea loams, Milltown loam, Thornapple sandy loam, Cushing loams, Rice Lake loam, Chetek sandy loam, Meridean sandy loam, Sterling sand, Hartland silt loam, Auburn loam, and peat and muck. Mechanical analyses of each type of soil were furnished by the Bureau of Soils of this Department.

An appendix on the correlation of the soils of the region with those of north-central Wisconsin (E. S. R., 16, p. 27) is added.

Black soils (chernozem), P. KOSSOVICH (*Internat. Mitt. Bodenk., 1 (1912), No. 3–4, pp. 199–354, figs. 20*).—The author gives a complete characterization, based on his own investigations and a study of the literature, of the black or chernozem soils of Russia, including their origin and history, distribution, topographic features, vegetation, climatic conditions, and physical and chemical properties.

It is stated that the chernozem territory covers almost the entire southern half of European Russia, besides isolated areas in western and eastern Siberia. It is an undulating plain, with occasional extensive elevations and ravines. In it are distinguished 3 climatic zones, the northern, central, and southern. In the central zone the typical chernozem soil predominates, whereas along the boundary of the north zone the soil is somewhat modified in that it merges into the gray forest soil of upper Russia. Along the southern boundary the chernozem merges into the chestnut soils of the dry steppes.

In virgin steppes, the chernozem is usually covered with a layer of vegetable débris and mineral matter from 2 to 4 cm. in thickness. The surface soil is uniformly dark in color and has a more or less granular appearance. As the soil merges into the subsoil, the color becomes irregular. The surface zone, called zone A in the Russian terminology, usually extends to a depth of 60 cm. and is the resultant of many genetic factors. Below this depth, called zone B, the character of the soil is determined largely by the parent rock. It is coarser in structure and the size of the granules increases in it as it also does with the clay content of the soil. In very sandy soils the granular structure may be entirely absent.

The depth of the humus layer of the soil in general varies from 70 to 100 cm. It appears that the depth of soil decreases from west to east and from the center of the chernozem region to the northern and to the southern boundaries. It has also been observed that with few exceptions the depth of the humus layer is greatest for the soils derived from the coarse-grained rocks, which is ex-

plained on the ground that the roots of plants and the humus material can penetrate the rock crevices more easily. The depth of the humus layer seems to be less for soils derived from limestones and crystalline rocks.

The physical properties of a chernozem soil are determined largely by its high content of fine particles and humus. In general the soils have a porosity varying between 50 and 60 per cent, which decreases with the depth of soil, a high water capacity and hygroscopicity, and conduct heat poorly. The specific gravity varies between 2.5 and 2.6.

The size of the soil particles is not determined by the parent rock alone, but is the resultant of many genetic factors. The humus content in general varies between 6 and 10 per cent, but in certain cases it has fallen as low as 4 per cent and exceeded 20 per cent. The humus is but slightly soluble in water, the soluble amount varying between 0.02 and 0.05 per cent.

The chernozem soils are rich in all the mineral elements of plant food. The soils have a high zeolite content, which varies considerably (15 to 30 per cent) for the different soils and is determined to a large extent by the character of the parent rock. The zeolites contained about 50 per cent silicic acid. The phosphoric acid content varies from 0.12 to 0.25 per cent and is much higher for the surface than for the subsoil. It is believed that the total phosphoric acid content is from 20 to 25 per cent higher than that soluble in hydrochloric acid.

Red boulder clay, J. Van Baren (*Internat. Mitt. Bodenk., 1 (1912), No. 3–4, pp. 355–366, pl. 1*).—In his studies of the glacial deposits of the Netherlands, the author has encountered a red boulder clay, which occurs in a small area near the coast of the Zuider Zee, between the Vecht and Yssel rivers.

The soil is described as a very dry sandy clay, resembling in its typical state the laterite of the Tropics. Analyses showed a low content of the mineral elements of plant food. The iron silicates were covered with a thin coating of iron oxid, in which respect the soil differs from the overlying gray boulder clay to the east. This led the author to believe that the red boulder clay is a distinct glacial formation, which owes its characteristic red color to the weathering processes of the interglacial period.

Reference is also made to the occurrence of soils similar in characterstics in northern Germany, Russia, northern Italy, Great Britain, and the United States.

Soil acidity and its significance for soil cultivation, N. Solenow (*Die Bodenacidität und ihre Bedeutung für den Kulturboden. Diss. Univ. Jena, 1909, pp. 68; abs. in Chem. Abs., 6 (1912), No. 2, p. 268*).—The nature of the acids in soils and their effect upon the germination of seed and the growth of plants are discussed.

It is shown that the number of bacteria in acid soils is small, while fungi are numerous. It is stated that difficultly soluble acids in humus exert a harmful effect by liberating toxic mineral acids. Methods of determining soil acidity are discussed and an improvement of the method of Tacke and Süchting (E. S. R., 19, p. 1009) is proposed.

The fineness of the soil and the quality of wine, G. Chappaz (*Proc. Agr. et Vit., 28 (1911), No. 44, pp. 509–514; abs. in Rev. Sci. [Paris], 50 (1912), I, No. 9, pp. 279, 280*).—This article reports and discusses the proportion of coarse material, rocks, and gravel in the soil of typical vine-growing regions in France.

Soils containing more than 50 per cent of rocks and gravel are considered infertile. When present in smaller proportion rocks and gravel are considered beneficial for grape growing by absorbing heat during the day and lessening evaporation. It is a matter of common observation that the best wines are obtained from vineyards on gravelly soils, although it is not maintained that

quality is entirely due to this cause. Attention is also called to the fact that stony soils are favorable to the ripening and quality of cereals.

Some factors influencing the percentages of mineral plant foods contained in soils, O. D. VON ENGELN (*Amer. Jour. Sci., 4. ser., 32 (1911), No. 191, pp. 350–358; abs. in Chem. Abs., 6 (1912), No. 3, p. 402*).—In this article an attempt is made to correlate selected soil analyses with soil history "in order to ascertain if any correspondence exists between the present chemical composition of soils and the formative processes involved in their production."

The general conclusion reached is that there are not sufficient reliable data on the chemical composition of soils in the United States to warrant broad generalizations regarding the effects of varying amounts of mineral plant food on soil fertility, and that further systematic investigation along this line is needed.

The results, however, "indicate a relationship between chemical composition and the geologic-physiographic conditions of soil origin and state." For example, residual soils are apparently notably deficient in plant food (phosphoric acid, potash, and lime) as compared with their parent rocks. Soils of the younger glaciation uniformly show more plant food (phosphoric acid and potash) than those of the older glaciation, the residual soils being intermediate in this respect. The author is of the opinion that soil classification should follow physiographic principles and that "the names of soil series might well correlate with recognized physiographic and geologic formations in the United States."

A brief study of the phosphorus associated with the matière noire, J. STEWART (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 379*).—In this paper, which was presented at the Washington meeting of the American Chemical Society in 1911, the author "attempts to answer the question: Is the phosphorus in the matière noire organic or inorganic?

"Treatment of the soil with ammonium hydroxid fails to extract any phosphorus. Partial removal of acid-soluble phosphorus and complete removal of acid-soluble phosphorus, followed in each case with ammonium hydroxid extraction, gives ammoniacal solutions with practically identical phosphorus content, viz, approximately 0.0103 per cent on soil. The conclusion is that all the phosphorus associated with the matière noire is organically combined. Practically all the iron and aluminum present in the matière noire are organic. Hydrolysis takes place during extraction with alkali and a large part of the phosphorus and some iron and aluminum are converted into inorganic forms.

"Several precipitating reagents for separating inorganic phosphorus from organic were tried, but results were unsatisfactory."

Nucleic acids in soils, E. C. SHOREY (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 390*).—This is an abstract of a paper presented at the Washington meeting of the American Chemical Society in 1911.

It is stated that "nucleic acids have been obtained from soils by extraction with dilute sodium hydroxid, neutralizing and concentrating under reduced pressure, acidifying with acetic acid and addition of several volumes of alcohol, as a light-colored amorphous body, which on hydrolysis gave pentose sugars, purin bases, pyrimidin compounds, levulinic acid, and phosphoric acid. Xanthin and hypoxanthin were identified among the purin bases and cytosin among the pyrimidin compounds."

The action of nucleic acid and its decomposition product on soils and plants, O. SCHREINER and J. J. SKINNER (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 390*).—In a paper presented at the Washington meeting of the American Chemical Society in 1911, of which this is an abstract, it is stated that "nucleic acid as well as some of its decomposition products occur in soils, and the effect

of some of these compounds has been studied with wheat seedlings. Mineral nutrient solutions with phosphate, potash, and nitrate in varying proportions were used, and to these were added 50 parts per million of the compound tested.

"The neutralized nucleic acid as well as its nitrogenous decomposition products, hypoxanthin and xanthin, had a beneficial action on the plants, promoting growth and decreasing the nitrate absorption. The plants appear to be able to utilize these compounds directly in their metabolism and require under these circumstances less nitrate for maximum growth."

Origin of creatinin in soils, M. X. SULLIVAN (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 390*).—This is an abstract of a paper presented at the Washington meeting of the American Chemical Society in 1911 and containing results previously noted (E. S. R., 26, p. 419).

Studies on soils subjected to dry heat, E. D. CLARK and F. J. SEAVER (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 389*).—The paper presented at the Washington meeting of the American Chemical Society in 1911, of which this is an abstract, reports an extension to green plants of earlier observations by the authors on the effect of heating soils on the growth of fungi.

It was found that "different degrees of dry heat give soils whose aqueous extracts have a brown color the depth of which is proportional to the intensity of the heat. The amount of soluble matter, organic, inorganic, nitrogen, etc., was also proportional to the different temperatures (90 to 180° C.). The dark extracts from strongly heated soils were favorable for fungus growth but were distinctly unfavorable to lupine seedlings grown in them, this inhibiting action being greatest in the darkest-colored extracts. Oats sown in a series of soils heated to different temperatures showed a slight stimulation for the temperature up to 125°, when compared with the unheated soil as a control, while above 125° the heated soil had a very toxic effect. The organic matter of the darker extracts gives nearly all the tests for reducing sugars, is largely precipitated by acetone, smells like caramelized sugar, and has a strong acid reaction to litmus."

Partial sterilization of glasshouse soils, E. J. RUSSELL (*Gard. Chron., 3. ser., 51 (1912), Nos. 1312, pp. 97, 98, figs. 3; 1313, pp. 113, 114, fig. 1*).—A brief account is here given of the application of the results of the author's investigations on partial sterilization of soils (E. S. R., 22, p. 121) to the sick soils thrown out from commercial cucumber and tomato greenhouses. The results led to the conclusion that by partial sterilization, preferably by heating to about 200° F., growers of tomatoes and cucumbers under glass may at small cost be saved from what has hitherto been the expensive necessity of frequently renewing their soils.

Partial sterilization of soil for glasshouse work, E. J. RUSSELL and F. R. PETHERBRIDGE (*Jour. Bd. Agr. [London], 18 (1912), No. 10, pp. 809–826, pls. 4*).—This is a more detailed account of the investigations briefly referred to above, and includes studies with chrysanthemums, spinach, radishes, tomatoes, cucumbers, and various ornamental plants. The conclusions reached are summarized as follows:

"Partial sterilization of soil increases the supply of food for the plant, somewhat alters the growth of the plant, and kills insect pests.

"It may cause a temporary retardation in germination and in early growth, the amount of which varies according to the nature of the soil, the seed, and the general conditions.

"In our experiments it has not proved advantageous for pot work where abundant supplies of clean virgin soil and manure are available.

"It is, however, very useful for work with borders, cold frames, and for plants that are to run for some time without manure. It leads to better root

development, sturdier and healthier plants, earlier flowering, more prolific fruiting, and better quality of fruit.

"It is particularly useful for commercial glasshouses where soil pests are a source of trouble, and soil 'sickness' sets in.

"At present the most effective method of partial sterilization is to heat the soil to a temperature above 140° F., but not exceeding 212° F. Very satisfactory results have been obtained between 180 and 200° F.; ½ cwt. or less fuel is required per ton of soil; capital and labor charges depend on the speed at which the process is to be worked. Our experiments indicate that effective chemical treatment is also possible, and would, of course, be much simpler, but we have not yet tested a sufficient number of commercial products to discuss the problem from the grower's point of view."

Bacterial activities in frozen soils, P. E. Brown and R. E. Smith (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 380*).—In this paper, which was presented at the Washington meeting of the American Chemical Society in 1911, the authors report investigations made during the winter months of 1910–11, in which it was found "that bacteria which developed on synthetic agar plates, ammonifying, nitrifying, denitrifying, and nitrogen-fixing species whose activities were tested by the beaker method, were alive and multiplied in frozen soils.

"In explanation of this, the theory is advanced that when soils freeze the hygroscopic water remains uncongealed, because of the surface tension exerted by the soil particles on the film water, its normal concentration in salts, and its increased concentration occurring when the main body of soil water begins to freeze.

"Temperature exerted more influence than moisture on the bacteria developing on the agar plates."

Contributions to our knowledge of soil fertility, II.—The determination of Rhizobia in the soil, R. Greig-Smith (*Proc. Linn. Soc. N. S. Wales, 36 (1911), pt. 3, pp. 492–503*).—The author reports upon the method of growing soil organisms by which he is able to demonstrate the number of Azotobacter in soil. In the course of his investigation it became apparent that the most numerous nitrogen-fixing organism present was the Rhizobium, and a report is given on the determination of this organism in various samples of soil by the selective medium method. To a certain extent, there seemed to be a parallel between the fertility of the soil and the number of Rhizobia contained in it. The effect of cultivation is to increase greatly the numbers of these organisms in a given soil.

Summarizing his results, the author states that the number of nitrogen-fixing Rhizobia in agricultural soils varies from 3 to 4 millions per gram, and that the number present affords an indication of the comparative fertility of the soil.

Certain factors limiting nitrification, I. G. McBeth and R. C. Wright (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 392*).—The following summary of a paper presented at the Washington meeting of the American Chemical Society in 1911 is given:

"Two per cent of glucose and 2 per cent of starch disappeared from soil in less than 7 days. Cellulose disappeared more slowly. The addition of glucose and starch caused a rapid disappearance of nitrate from eastern and western soils; with cellulose the reduction of nitrate was less rapid.

"Two per cent of fresh horse manure caused only a partial disappearance of soil nitrate. After 7 days in eastern soil and 21 days in western soil nitrification became active, causing an increase in nitrate.

"Nitrification took place rapidly in rotted manure; the addition of 5 per cent of cellulose caused rapid denitrification.

"Nitrification in the soil is inhibited by carbonates, chlorids, and sulphates, the former having the strongest effect and the latter the least effect.

"There are certain seasonal variations in the rate of nitrification in soil."

The mobilization of the phosphoric acid of the soil under the influence of the life activity of bacteria, II, S. A. SEWERIN (*Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 20–25, pp. 498–520*).—Continuing experiments previously noted (E. S. R., 24, p. 530), the author found that there was a decrease of easily soluble phosphoric acid, both with and without addition of phosphates, in soils which were first sterilized and then inoculated with soil bacteria. No relation was clearly shown to exist between the production of carbon dioxid and increase in bacteria and the amount of easily soluble phosphoric acid. The end effect appeared to be a resultant of complex changes standing in close relation to the individual characteristics of the bacteria involved.

The Swedish Moor Culture Society, 1886–1911 (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 7, pp. 607–667, pls. 3, figs. 8*).—The proceedings of the society at the twenty-fifth anniversary meeting at Jönköping, November 24, 1911, are given. The two main addresses were by H. von Feilitzen on What has the Swedish Moor Culture Society accomplished during the past Twenty-five Years, and by E. Haglund on The Peat-Geological Investigations of the Swedish Moor Culture Society.

Farming with green manures, C. HARLAN (*Wilmington, Del., 1912, 7. ed., rev. and enl., pp. 155, figs. 7*).—It is stated that in this edition the book has been completely revised "by an agronomist of the Agricultural Department of the U. S. Government . . . in the light of the important scientific discoveries made since the earlier editions were issued."

The fundamental purpose of the book is to point out how soil fertility can be maintained on the ordinary farm with the least possible outlay of labor and money.

Field experiments on individual farms, H. J. WHEELER (*Rhode Island Sta. Bul. 148, pp. 17–44+II, pl. 1*).—Brief accounts are given of miscellaneous experiments in different parts of the State, mainly with fertilizers on various crops. These experiments included tests of complete fertilizers and of acid phosphate, basic slag, floats, slaked lime, and ground limestone on grass, drilling and broadcasting fertilizers for potatoes, effect of fertilizers on the color of Baldwin apples, the effect of ground limestone on oats, effect of lime on beets, comparative value of basic slag and acid phosphate for beets and turnips, a comparison of basic slag and acid phosphate in fertilizers for cantaloups and asparagus on limed and unlimed soil, and comparisons of various fertilizer combinations for corn.

The results obtained under a great variety of conditions do not permit of broad generalizations. They indicated in one case a decided profit from the use of fertilizers, especially those containing a liberal proportion of acid phosphate, on grass. In another case acid phosphate with air-slaked lime and ground limestone gave smaller yields of grass than acid phosphate alone. Floats and air-slaked lime gave as good results as acid phosphate alone, while slag and air-slaked lime gave better yields than the acid phosphate. The inadvisability of top-dressing grass lands which contain only an imperfect stand of desirable grasses with fertilizers was shown in one case. Drilling was a more effective method of applying fertilizers to potatoes than broadcasting. The color of apples seemed to be improved by application of double sulphate of potash and magnesia. Slag increased the yield of beets and turnips more than acid phosphate. Liming was decidedly beneficial to beets, mangel-wurzels, and cantaloups. Basic slag was especially effective in increasing the yield of asparagus. Large applications of fertilizers to corn in a dry season were unprofitable.

Chemical analysis of vegetables in relation to their fertilization, A. MAZZARON (*Bul. R. Soc. Toscana Ort., 3. ser., 17 (1912), Nos. 1, pp. 15–20; 2, pp. 40–51*).—The fertilizer requirements of peas, lettuce, and onions as indicated by chemical analyses showing the fertilizing constituents of these vegetables are discussed.

Applied electrochemistry, M. DEK. THOMPSON (*New York, 1911, pp. XII+329, figs. 137; rev. in Amer. Chem. Jour., 47 (1912), No. 4, pp. 357, 358*).—The chapter of this book which is of special agricultural importance is that dealing with electrical fixation of atmospheric nitrogen.

Suggestions regarding lime nitrogen, A. STUTZER (*Mitt. Deut. Landw. Gesell., 27 (1912), No. 11, pp. 166, 167*).—Experiments in which from 40 to 50 kg. of nitrogen per hectare, in the form of lime nitrogen, was mixed with from 60 to 100 kg. of iron oxid with marked benefit as regards the increase of yield of oats, wheat, and rye are briefly referred to.

A report on the natural phosphates of Tennessee, Kentucky, and Arkansas, W. H. WAGGAMAN (*U. S. Dept. Agr., Bur. Soils Bul. 81, pp. 36, pls. 4, figs. 3*).—The phosphate deposits of Tennessee are considered to rank next in importance to those of Florida. The bulletin describes conditions in these phosphate fields, outlines the modern methods of mining and handling the rock, and shows what is done with the finished product and by-products of the industry. It is stated that "the conditions in the Tennessee fields have changed considerably within the last few years, mining methods have improved, deposits of lower-grade rock are being exploited, and many of the old mines and dumps are being reworked."

The Tennessee deposits "occur in what is known as the Central Basin of Tennessee (elevation, 600 ft.) and in the valleys of the western part of the Highland Rim (elevation, 1,000 ft.) surrounding this basin. The Central Basin . . . covers an area of approximately 7,000 square miles of gently undulating country. The phosphate deposits have been developed only in the western part of this area, workable beds lying in parts of Sumner, Davidson, Williamson, Lewis, Maury, Hickman, and Giles counties. . . .

"There are 3 economically important classes of phosphate rock in Tennessee, namely, the brown phosphate, or Ordovician rock, which is divided by Hayes and Ulrich into several groups; the blue, or Devonian phosphate, of which there are several classes, and the white rock deposited from solution in caverns. The nodular and conglomerate phosphates, though widely distributed, are not found in sufficient quantities to be profitably mined by themselves." These classes are discussed separately and in detail in the bulletin.

"The [Kentucky] phosphate area so far examined lies in Woodford, Fayette, Scott, and Jessamine counties, but the most thoroughly prospected properties lie in Woodford County, in the vicinity of the little town of Midway. . . . The phosphate occurs in the Ordovician ('Lower Silurian') system, at the top of the geologic formation known as the Lexington limestone. . . . Up to the spring of 1911 work on the Kentucky phosphate area had been confined to prospecting. A small plant is now in course of construction, which will start operations this year and will probably accelerate greatly the development of the area. . . .

"The phosphate deposits of Arkansas are not generally regarded as of great economic importance. Compared with the product of the Tennessee and Florida fields the rock is rather low grade. The deposits are well situated to supply the growing demand for fertilizers west of the Mississippi River, and, though much of the material is too low in phosphoric acid and too high in iron to make it desirable for the manufacture of superphosphate, the increasing consumption of ground rock phosphate for agricultural purposes will no doubt

hasten further development in these fields. . . . The portion of the phosphate fields now being worked lies in the northwestern part of Independence County, along Lafferty Creek, north and east of the White River. The deposits, however, extend over a considerable area in north-central Arkansas, and the phosphate horizon has been recognized in Stone, Izard, Searcy, Marion, Baxter, and Newton counties. . . . There is every probability that the mining operations in the Arkansas phosphate fields will be extended."

Phosphate mining in relation to the fertilizer industry, C. G. MEMMINGER (*Manfrs. Rec., 61 (1912), No. 7, pt. 2, pp. 55–57; Amer. Fert., 36 (1912), No. 7, pp. 46–50*).—This article discusses briefly the sources of phosphate in the United States, the companies engaged in mining phosphate, shipments of phosphate from 1900 to 1910, and a comparison of fertilizer consumption in the South in 1901 and 1910. The figures show a rapid growth of the phosphate and fertilizer industries.

On the fertilizing action of sulphur, A. DEMOLON (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 8, pp. 524–526; abs. in Rev. Sci. [Paris], 50 (1912), I, No. 9, p. 285*).—In a study of the cause of the fertilizing effect of crude ammonia, which contains on an average 40 per cent of free sulphur, the author tested the effect of adding flowers of sulphur (10 gm. per square meter of soil) to ruta-bagas, beets, and parsnips in pot experiments, and found a marked increase in yield in every case. He also studied the rate of transformation of the sulphur into sulphate in the soil. He found that the sulphur was slowly converted into sulphate in certain soils, and he is of the opinion that this has an important bearing upon the fertilizing effect of the sulphur. Field experiments to test the matter more fully are in progress.

Conversion of marc into fertilizer, L. ROOS (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 38, pp. 351, 352*).—The composting of marc with lime, phosphates, and potassium sulphate is briefly described.

Analyses and valuations of commercial fertilizers and ground bone, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 241, pp. 3–41*).—This bulletin, with Bulletin 240, already noted (E. S. R., 26, p. 225), gives the complete results of fertilizer inspection in New Jersey during 1911. This involved the collection of over 1,000 samples and analyses and valuations of 514 brands of complete fertilizers and 23 miscellaneous fertilizers representing 105 manufacturers.

Particular attention is called to the new method of determining and reporting the character of organic nitrogen in fertilizers as agreed upon by the experiment stations of the New England States, New York, and New Jersey. This involves the reporting of water-soluble organic nitrogen, active insoluble organic nitrogen, and inactive insoluble organic nitrogen.

The fertilizers examined during the year furnished on the average the amount of plant food which they were guaranteed to contain, although in many cases deficiencies in one constituent were made up by excess in others. "There was apparently more nitrogen used in the form of nitrate of soda and ammonia salts and a smaller quantity of organic nitrogen, than in former years."

Fertilizer analyses, H. B. MCDONNELL ET AL. (*Md. Agr. Col. Quart., 1912, No. 55, pp. 32*).—This bulletin gives tables showing analyses and valuations of fertilizers inspected from August, 1911, to January, 1912, inclusive.

AGRICULTURAL BOTANY.

The comparative viability of seeds, fungi, and bacteria when subjected to various chemical agents, R. DE ZEEUW (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 1–4, pp. 4–23, fig. 1*).—For certain physiological experiments seeds free from bacteria and fungi are essential. This work was undertaken to show

whether or not the present methods of disinfecting seeds are adequate to furnish material safely free from such infection. Lots of 25 each of the seeds of white lupine, peas, wheat, barley, corn, and white mustard were used in the experiments, similar lots in each case being treated for various lengths of time with each of the following disinfectants: Cleaning fluid, mercuric chlorid, hydrogen peroxid, potassium bichromate, ammonium persulphate, bromin water, and formaldehyde gas, on dry seeds and on seeds soaked in water for 5 minutes. In the first series of experiments the efforts were directed toward determining the length of time each kind of seed could be left in each one of the disinfectants and still yield from 70 to 80 per cent of good seedlings. The second series was used to determine the effects of the different treatments on the fungi and bacteria when applied for as long a period as had been found to be safe.

The results obtained by the author are rather strikingly opposed to those of other workers, showing quite uniformly a failure to destroy the contaminating organisms within the periods of safety to the grains, except in a few instances. Of the 48 lots tested only 2 lots of white mustard and 3 lots of white lupine were completely freed from bacteria and fungi. The only disinfectants wholly successful in this respect were cleaning fluid and peroxid of hydrogen. Bromin water was successful in the case of white lupine.

The author concludes that the majority of cases of so-called disinfection are merely cases of antisepsis, and that antisepsis and not disinfection must probably be looked to for practical results in the future. This he claims will ordinarily suffice, since in most physiological experiments it is not the mere presence of dead or dormant organisms in or on the grains, but their active growth and multiplication, that impairs the value of the results. Absolute disinfection, which seems out of the question at present, is not considered essential in most cases.

An extensive bibliography is appended.

The persistence and vitality of bacteria on alfalfa seed, M. J. PRUCHA (*Abs. in Science, n. ser., 35 (1912), No. 893, p. 229*).—Attention is called to the difficulty of sterilizing seeds such as wheat, corn, peas, alfalfa, etc., without killing them. It has also been found that bacteria of disease are carried on beans and corn, and the author conducted experiments to determine to what extent bacteria may persist on seeds.

Quantitative and qualitative studies were made of 19 samples of alfalfa seed, grown and collected in 1909, from 11 different States. The study was pursued for 2 years. In the fresh seed the bacterial content varied from 12 to 16,000 per seed. With increasing age the germ content decreased. A typical sample which when fresh had an average of 7,780 bacteria per seed, at 2 years of age gave 340 bacteria per seed.

Of the 84 different group numbers determined, 35 were Bacillus, 21 Bacterium, 19 Pseudomonas, 1 Streptococcus, and 8 yeasts.

The influence of light on the germination of seed, W. LUBIMENKO (*Rev. Gén. Bot., 23 (1911), No. 274, pp. 418–436, dgms. 2; abs. in Trudy Imp. S. Peterb. Obshch. Estestvo. (Trav. Soc. Imp. Nat. St. Petersb.), 42 (1911), I, No. 3, pp. 142, 152, 153*).—Studies were made of the germination of the seeds of *Pinus sylvestris*, *Caragana arborescens*, *Betula alba*, and *Picea excelsa* in different conditions of light and darkness.

The author found that from a physiological standpoint it is necessary to distinguish two types of germination, one germination in the light and the other in darkness. For the first type of germination light is believed to play a stimulating effect, and the maximum germination is attained under an optimum illumination. For the second type light has a retarding and sometimes a detrimental effect unless it is very feeble. In the first class *P. sylvestris* and *B. alba*

seem to be best adapted to germination in strong illumination, while *P. excelsa* prefers a feeble illumination or darkness. The seed of *C. arborescens* seems to be adapted to germinate equally well in the light or in the dark.

The effect of freezing seed on their germination and the relation between frost influence and light influence, W. KINZEL (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 9 (1911), No. 8, pp. 105–114*).—This is a detailed account of recent and extensive investigations by the author on seeds of 375 species representing many families. These were made for the purpose of ascertaining the several and joint effects of temperature (especially below the freezing point) and light on the time and percentage of germination of such seeds, having in view their bearing upon the control of agricultural weeds, numerous species of which were represented in the test.

With many kinds the minimum or absence of light seemed as essential to germination as its abundance to others. With some, also, a period of exposure to cold appeared to be as essential to ultimate germination as a subsequent period of warmth, in concurrence with other necessary conditions. The various combinations of these factors gave results which were numerous and practically suggestive.

The investigation of a climatic gradient, F. SHREVE (*Abs. in Science, n. ser., 35 (1912), No. 891, pp. 157, 158*).—The author describes the distribution of plants on the slope of the Santa Catalina Mountains, stations being located at intervals of 1,000 ft. and the temperature, rainfall, soil moisture, humidity, evaporation, and soil temperature determined.

It is claimed that the factors of soil moisture supply and atmospheric humidity, modified by slope exposure, determine the lower limits of forest and the trees of the chaparral zone. The factors of winter cold, modified by topography through the operation of cold-air drainage, determine the upper limits of the characteristic desert species.

The nature of the absorption and tolerance of plants in bogs, A. DACHNOWSKI (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 156*).—The author claims that a study of the quantitative nature of habitat factors, which are rightly desired as a basis for a theory of physiologically arid habitats, does not explain the nature of the absorption of plants in bogs and the nature of their tolerance to toxic substances in peat soils. The phenomena of absorption and of resistance to desiccation deal with considerations of the permeability of the absorbing protoplasmic membrane, its power of endurance, and its ability to transform the injurious bodies into insoluble, impermeable compounds.

Observations on evaporation and transpiration in prairie and forest, B. SHIMEK (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 157*).—An effort has been made to determine the differences between forest and prairie plants which would account for their distribution, observations being made on the transpiration on certain forest and prairie plants in their native habitats and their transposed ones. Two stations were selected on a ridge, one side of which is prairie and the other forest, one station being located in each. Two plants, one from the forest and one from the prairie, were placed at each station, and the loss of water was determined at 2 hour intervals. In addition to this, observations were made at each of the stations on evaporation, and the meteorological conditions affecting it.

The general results showed that transpiration and evaporation are not coincident.

Shade as a factor influencing evaporation, G. P. BURNS (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 157*).—A description is given of some experiments to determine the evaporation in forest nurseries, in which plants were sub-

jected to full shade, half shade, consisting of lath cover and wooden sides, and half shade with wire sides, and in pine woods.

The data gathered seemed to show that the shading of young trees is a matter of evaporation rather than one of light, as is generally stated. The average amounts of daily evaporation at the different stations were as follows: Control 45 cc., full shade 19 cc., half shade with solid sides 20 cc., half shade with wire sides 43 cc., and in pine woods 16 cc. Of these amounts from 17 to 25 per cent was lost during the 12 hours from 6 o'clock p. m. to 6 o'clock a. m.

A balancing method for differentiating between absorption and transpiration, L. J. BRIGGS and H. L. SHANTZ (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 158*).—The authors give a description of a form of apparatus for differentiating between absorption and transpiration by plants. This consists essentially of potted plants suspended upon knife edges in a horizontal position and so balanced by counterweights and the center of gravity so adjusted as to secure the required sensibility. By means of this method water loss through transpiration may be determined. The method is said to be also adapted to the determination of the wilting coefficient of plants, which, owing to structural peculiarities, do not wilt when the moisture content of the leaves is reduced.

A further study of the influence of temperature on the respiration of the higher plants, J. KUYPER (*Ann. Jard. Bot. Buitenzorg, 2. ser., 9 (1911), pt. 1, pp. 45–54, pls. 2*).—The author continued his investigations along the lines previously marked out by F. F. Blackman, A. M. Smith, H. M. Ward, and himself (E. S. R., 17, p. 234; 18, p. 923; 24, p. 533; 25, p. 220; 26, p. 227) with reference to the respiration of tropical plants. From the results of his experiments he concludes in brief that the influence of temperature in the case of the tropical plants investigated is the same as that found to operate in plants of the Temperate Zones, and that his findings are in general confirmatory of Blackman's views.

Periodical daily fluctuations of respiration in foliage leaves in darkness and their possible bearing upon carbon-dioxid assimilation, A. MEYER and N. T. DELEANO (*Ztschr. Bot., 3 (1911), No. 10, pp. 657–701, figs. 11*).—Besides discussing the results of their own previous work and that of others in this connection, and giving a rather extensive bibliography, the authors report in some detail on their own later experiments.

These were carried out with leaves of *Vitis vinifera*, *Acer pseudoplatanus*, and *Rubus idæus* to ascertain the daily variation of carbon-dioxid evolution both during and after a period of traumatic stimulation due to the separation of the leaves from the plants. During that reaction period, which tended to be repeated with each injury to the leaves, there was normally a heightening of the process to a maximum reached in from about 1 to 3 days, and after this a lowering to a medium rate of carbon-dioxid evolution for each case. About this medium the rate showed a daily fluctuation, differing in degree in different experiments, the daily curve exhibiting such factors as time, temperature, nature and degree of wounding, etc. The stomata seemed to have no significance in connection with this daily periodicity. Different kinds of leaves were found to possess specific capacities for carbon-dioxid production. The maximum rate tended to be reached in the daytime, or in the period of stimulation following illumination. This tendency lends support to the hypothesis that respiration is an essential part of the process of assimilation.

The influence of phosphates on the separation of carbon dioxid by plants, L. IWANOFF (*Biochem. Ztschr., 25 (1910), No. 2–3, pp. 171–186*).—The author reports that he finds from his investigations on wheat and pea seeds, as well as with yeast fermentation, that both aerobic and anaerobic evolution of carbon dioxid is accelerated by the influence of phosphates.

The permeability of protoplasm to ions and the theory of antagonism, W. J. V. OSTERHOUT (*Abs. in Science, n. ser., 35 (1912), No. 891, pp. 156, 157*).—A description is given of experiments performed to test the electrical conductivity of living tissues in various solutions.

The results show conclusively that a great variety of ions readily penetrate living cells, and that antagonism between salts may be explained by the fact that they hinder or prevent each other from entering the protoplasm. The ions of sodium chlorid readily penetrate the protoplasm, but the addition of a small quantity of calcium chlorid hinders this penetration. Such salts as the chlorids of potassium, magnesium, cæsium, rubidium lithium, and ammonium, and the bromid, iodid, nitrate, sulphate, and acetate of sodium act in general like sodium chlorid, while barium and strontium chlorids act like calcium chlorid.

The mechanism of this action is not fully understood, but it is believed that calcium, barium, and strontium chlorids bring about visible changes in the plasma membrane which are quite different from those produced by such salts as sodium chlorid.

Investigations on the localization and function of potassium in plants, T. WEEVERS (*Rec. Trav. Bot. Néerland., 8 (1911), No. 3–4, pp. 289–332, figs. 3*).—A study is reported of a large number of plants representing the principal groups and families of both the higher and lower plants to determine the localization of potassium in their tissues.

In all plants except the Cyanophyceæ potassium was found by the microchemical method wherever employed. The nucleus was never found to contain potassium, nor was it positively recognized in the cytoplasm. The greatest amount of potassium in the cell is to be found in the vacuoles, none being present in either the chromatophores or chlorophyll. Potassium salts can be extracted from algal filaments and pollen tubes with a 50 per cent solution of alcohol, and from dead spirogyra by water. The seeds and leaves of the horse chestnut give up most of their potassium compounds in water cultures. Among the phanerogams the potassium reaction is most pronounced in the parenchymatous tissues, especially in the growing points and reserve organs. In the vessels the reaction is weak, and in the path of the transpiration stream the solution is very dilute. Potassium was found especially abundant in the living wood, medullary rays, cambium, and in the unlignified portion of the bark parenchyma, while in the vessels and tracheids the reaction was very slight. The medullary rays and other living portions of the plant seemed to serve as storage organs for this substance.

The localization of potassium leads to the hypothesis that it is specially connected with the formation of protoplasm in the growing points. Its function in the expanded leaf is unknown, but it is believed to be associated with the synthesis and metabolism of proteids. In the vacuoles it is thought to regulate turgidity.

Observations on the physiological significance of caffein, T. WEEVERS (*Ann. Jard. Bot. Buitenzorg, 2. ser., 9 (1911), pt. 1, pp. 18–24*).—A somewhat polemical article, in which the author holds that caffein, like theobromin, is formed as the result of secondary processes in the assimilation of albumin, that it remains for a longer or shorter time as a storage product, and that it is then used again in the synthesis of albumin. The presence of caffein in considerable quantities in the seeds is explained by its assumed function as an economical form of nitrogen storage.

The influence of anesthetics on the osmotic properties of plasma membranes, W. W. LEPESCHKIN (*Ber. Deut. Bot. Gesell., 29 (1911), No. 6, pp. 349–355; abs. in Bot. Centbl., 117 (1911), No. 24, pp. 626, 627*).—This is an

account of the results obtained by the author from experiments with chloroform and ether on Spirogyra and *Tradescantia discolor* as exhibited by their absorption of coloring matters.

In the case of Spirogyra, the narcotized portions showed decidedly less permeability than did the normal portions of the same threads. Experiments with Tradescantia were held to show that the permeability of sodium nitrate (which is easily soluble in water, but sparingly so in chloroform and ether) is lessened by narcosis. The author claims that the decrease in permeability of plasma membranes by narcosis tends to support a hypothesis previously advanced by him that in the medium of the plasma membrane fatty bodies—perhaps lecithin and cholesterin—are to be found; also, that the manner of diffusion of salts and other bodies easily soluble in water is similar to that of anesthetics.

On the phototropic results of bilateral illumination, O. HAGEM (*Bergens Mus. Aarbok 1911, No. 1, Art. 3, pp. 1–18, pl. 1, figs. 3*).—This is a study along lines already marked out by Wiesner of the positions taken by plants illuminated from 2 directions. The principal findings are as follows:

Bilaterally illuminated seedlings tend to place themselves so that their curves lie in the vertical plane of the resultants of the 2 light intensities. This position can be calculated by graphical representation of the intensities as forces. The amount of their curvature appears to depend upon the value of such resultant. Experimental results conform closely to theoretical values.

Contributions on the morphology and biology of the tubercle bacteria of legumes, H. ZIPFEL (*Centbl. Bakt.* [*etc.*], *2. Abt., 32 (1911), No. 3–5, pp. 97–137*).—Besides noticing briefly the conclusions of other investigators in this connection, the author gives the results of his own researches, some of which may be stated as follows:

The bacteria of the root nodules of legumes will thrive in cultures of legume decoction, or in weak solutions of animal or vegetable albumin. They are not very sensitive to the reaction of the culture medium, which may vary from weakly acid to slightly alkaline without checking their growth. The zone of optimum temperature is between 18 and 20° C.; the limits of growth are 3 and 45°; and the upper limit of life is from 60 to 62°. They are not pathogenic as regards animals and are claimed to be not simple varieties of one species but of several distinct species the relationships of which are not yet clearly ascertained.

The assimilation of atmospheric nitrogen through thermophilous bacteria, H. PRINGSHEIM (*Centbl. Bakt.* [*etc.*], *2. Abt., 31 (1911), No. 1–4, pp. 23–27*).—The author claims that the heat-loving bacteria isolated by him were able to fix atmospheric nitrogen in considerable quantities, employing glucose as a source of necessary energy, but only when to the Winogradsky culture medium was added a decoction of soil, although what part this latter plays he did not ascertain. He reports also, as in his previous experiments (E. S. R., 23. p. 30), to have found that the lower concentration of glucose seemed to favor the higher utilization of energy material. It was strikingly noticeable that the fermentation and accompanying assimilation of nitrogen by the thermophiles proceeded much more rapidly than in the case of the anaerobic nitrogen-fixing bacteria.

Nitrogen compounds in growing mustard, DENSCH (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1911), No. 5, pp. 387–393*).—A report of a quantitative study of the several compounds of nitrogen present in mustard during its growth, and preliminary to a contemplated more general study of nitrogen transformations in cultivated plants.

The behavior of Pseudomonas radicicola in the soil, B. M. DUGGAR and M. J. PRUCHA (*Abs. in Science, n. ser., 35 (1912), No. 893, p. 229*).—A preliminary report is given showing the effects of conditions, especially drying, on the

vitality of the germ, and its multiplication in soil under the influence of various factors.

The results seem to indicate that there are undetermined factors which affect the vitality after drying, yet it seems certain that after the rapid or sudden drying out of soil cultures there remains a considerable number of living organisms. When soil cultures are directly and rapidly dried out the number of organisms found by the plate method may be not more than one-twentieth of those present when the drying began. This relates, however, to excessive drying.

In cultures of this germ in sterile soil, 16,000,000 organisms per gram were found after 5 days, which was considerably more than the number occurring per cubic centimeter in control bouillon cultures. In other experiments sterile and unsterile soils were mixed in various proportions, and the mixed material inoculated. It was found that the addition of unsterile soil inhibits the multiplication of the legume germ in proportion as the amount of unsterile soil is increased.

Soil organisms which destroy cellulose, K. F. KELLERMAN and I. G. MCBETH (*Abs. in Science, n. ser., 35 (1912), No. 893, p. 227*).—Attention is called to the paucity of our knowledge regarding cellulose destruction in soils. It is claimed that Omeliansky's conclusions that cellulose is destroyed only under anaerobic conditions and gives rise either to hydrogen or methan are erroneous.

Most of the species isolated by the authors were found to grow readily upon such media as beef agar, gelatin, starch, potato, and dextrose. Some of them had the power of liquefying gelatin, and although several were isolated under anaerobic conditions they were found to grow equally well or better in the presence of air. This shows that the destruction of cellulose by bacteria is an aerobic rather than an anaerobic process.

It has been usually supposed that filamentous fungi were of little importance in agricultural soils, but the authors' investigations indicate that they play as important a rôle as bacteria in destroying cellulose.

The green fluorescent bacteria of maple sap, H. A. EDSON and C. W. CARPENTER (*Abs. in Science, n. ser., 35 (1912), No. 893, p. 225*).—A study was made of the bacterial flora of maple sap, in which it was found that the green fluorescent bacteria are the most important agents in its deterioration. The bacteria feed upon the traces of protein present in the sap, but have little effect upon the sugar. Forty-two strains of this group of bacteria were isolated from maple sap. Thirty-three of them correspond closely with *Bacterium fluorescens liquefaciens*, 2 resemble *B. fluorescens mesentericus*, and 7 are similar to *B. fluorescens tenuis*.

The deposition of iron on the mycelium of an aquatic fungus, G. T. MOORE (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 153*).—The author reported the encrustation with iron of the mycelium from germinating spores of an aquatic fungus. The deposition of iron was not considered a vital one, as has been supposed for the so-called iron bacteria.

Observations on injurious effects of toxic substances on the olive tree, L. PETRI (*Centbl. Bakt. [etc.], 2. Abt., 28 (1910), No. 4–5, pp. 153–159, figs. 2*).—This is a study of the effects of metallic salts on olive seedlings. The substances employed were sulphates of copper, zinc, and lithium, chlorids of sodium, cobalt, and nickel, and acetate of uranium. These were applied to the roots either in the form of solutions mingled with the usual water supply of the plants, or as powder sprinkled upon the surface of the earth in which they stood and carried down with the regular watering. The experiments, begun in March, 1907, did not yield definite results until the summer and autumn of 1908.

Of the observed effects of the poisons the more important may be listed as follows: (1) Accumulation of the toxic substances, particularly in the older leaves, the chlorophyll of which is in part destroyed or the laminæ are in part dried out by the treatment; (2) a checking of the growth of the young shoots by cobalt; and (3) development of parasites (otherwise too weak to invade the vigorous plant) in the leaves the energy of which has been lowered by the injurious action of sodium chlorid. *Ascochyta oleæ, Stictis panizzei, Phyllosticta insulana, Coniothyrium oleæ*, and *Septoria oleæ* are mentioned as being favored by the weakening influence of the salt. In this connection suggestions are made as to the probable effects of soil solutions in nature in favoring parasitic and physiological diseases, and as to the study of such natural conditions.

Winterkilling and smelter injury in the forests of Montana, G. G. Hedgcock (*Torreya, 12 (1912), No. 2, pp. 25–30*).—The author has made an extended study of the winter injury of trees in the region about Anaconda, Mont., comparing this injury with that produced by smelter fumes from the large smelters situated nearby.

In both cases the needles of the pine trees are reddened, but the smelter injury causes a brighter color and does not so often kill the whole leaf as the winter injury. In the case of lodgepole pine and of Douglas fir trees the winter injury in the acute form killed not only the leaves but often the terminal buds and twigs, and the whole tree died the following season. In the acute form of smelter or sulphur dioxid injury the leaves die more gradually, and the terminal buds are usually the last portions of the tree to show injury. In the less acute form the injury by smelter fumes causes a slow defoliation of coniferous trees, while in the case of winter injury only a few terminal buds or twigs and the leaves are affected. A third form of smelter injury consists of a gradual premature defoliation of the trees, accompanied by slight chlorosis and change of appearance in the leaves.

In all the forms of smelter injury the effect on the annual rings is very pronounced, the size of the rings being gradually reduced, while in the case of winter injury there is usually a sudden stopping of growth. In case the winter injury was less severe but little growth was noticed in the year following the injury, followed by an increased growth the subsequent season.

Great difference in the ability of conifers to withstand the effect of smelter fumes is noted, and the ability of trees to withstand the winter injury is not in the same ratio as that of their resistance to smelter fumes. Trees in the inner portion of the smelter zone bear few if any seed, and reforestation is not progressing in this region, while outside of the smelter zone, where only winter injury has occurred, reproduction is said to be gradually taking place.

Investigations on wound stimulation and wound closure in plant organs, O. Schneider-Orelli (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 16–18, pp. 420–429*).—Experiments carried on with apples, pears, wounded potato tubers, and those attacked by fungi are reported.

In apples and pears plucked unripe, as well as in old tubers, it is claimed that the ability to supply a wound periderm ceases before the close of the traumatic respiration stimulation. At low temperatures apples form no cork over the wounded surface and permit infection thereat. Normal wound periderm forms at the cut surface of potatoes without the participation of deeper-lying tissue. Infected tubers usually respire more vigorously than sound ones, but this appears to be referable to the stimulation of the host cells much more than to the strong respiration of the parasite.

Endotrophic mycorrhiza of the horse chestnut, P. Jaccard (*Bul. Soc. Vaud. Sci. Nat., 5. ser., 47 (1911), No. 173, pp. XXV–XXVII; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, pp.*

1781, 1782).—In 1904 the author made an examination of the root system of a horse chestnut tree growing in the garden of the School of Forestry at Zurich, and found the lateral rootlets full of hyphæ and transformed into typical endotrophic mycorrhiza. Roots of this and of Pavia were obtained from several places, and some showed infestation while others were entirely immune.

To determine the cause of the unequal distribution, horse chestnuts were set out in 1907, some of the younger trees being cultivated in garden beds, others placed in pots in sterilized soil and grown near wild trees, and an examination made of the roots in 1911. Only those which were grown in pots without direct communication with the soil were infested. Those grown in the open beds or in pots the bottoms of which were open contained no trace of hyphæ. The trees grown in the confined soil area that showed the presence of mycorrhiza were small, though healthy and normal. It is believed that the development of the trees was retarded by the small amount of soil present, thus explaining the formation of mycorrhiza.

The results of the author's investigations led him to the conclusion that the penetration and development of hyphæ in the root system of Æsculus and Pavia, especially in the short roots, is a phenomenon of parasitism and not of symbiosis. The parasitism, however, is considered almost harmless.

The specific nature of the organism has not been determined. It was found that the activity of the fungus ceased with the drying of the rootlets.

Inhibiting factors in Lychnis and Papaver, G. H. Shull (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 159*).—A cross between white-flowered and purple-flowered forms of *L. dioica* from Germany is described, which in the F_1 generation is predominantly white-flowered, though previous crosses have given only purple-flowered offspring. The white-flowered form from Germany, in crosses with a recessive white American strain, produced in one case a white-flowered and in the other a purple-flowered form in the F_1 generation. In *P. rhœas* white has usually proved recessive to color, but in a cross between red and white, white progeny in the F_1 were produced.

The experiments suggest the existence of 2 complementary inhibiting factors, which have no effect except when coexisting in the same plant.

Inheritance in Capsella, H. Hus (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 159*).—The author states that seedlings from a single plant of *C. bursa pastoris* can be classed into 3 groups, broad leaved, narrow leaved, and linear leaved. These forms occur approximately in the proportion 2:2:1. This proportion has been maintained for 3 generations, and is considered as a simple Mendelian splitting in the F_2 generation of the Zea type, complicated by a defective inheritance ratio.

The relationship of the wheats, A. Schulz (*Ztschr. Gesam. Getreidew., 3 (1911), No. 10, pp. 209–211*).—This is a brief discussion of the supposed relationships as to descent existing among the several species of Triticum. The 8 forms considered are here placed in 2 main divisions, viz (1), the group of bearded wheats, including *T. monococcum*, *T. spelta*, and *T. dicoccum*, and (2) the group of naked or beardless wheats, comprising *T. vulgare*, *T. compactum*, *T. turgidum*, *T. durum*, and *T. polonicum*. The 2 main groups are further distinguished by the manner of breaking of the ripe ear spindle, the time of ripening, etc. Their possible relations as group forms to cultivated forms are also touched upon.

The anatomical structure of the wood of the graft hybrid Cytisus adami and its components, H. H. Janssonius and J. W. Moll (*Rec. Trav. Bot. Néerland., 8 (1911), No. 3–4, pp. 333–368, figs. 6*).—A report is given of an anatomical study of the wood of *C. adami*, which is claimed to be a graft

hybrid, and of its component species, *C. laburnum* and *C. purpureus*. The authors claim to have found the same differences and resemblances in the wood of known sexual hybrids as were recognized in *C. adami*.

Ingrowing sprouts of Solanum tuberosum, C. S. GAGER (*Abs. in Science, n. ser., 35 (1912), No. 891, pp. 159, 160*).—A description is given of potatoes in which the sprouts had grown through the tubers that bore them, ramifying freely and producing roots and small tubers within the large seed tuber. Investigation failed to show the presence of any enzyms by which the channels of the ingrowing sprouts could have been digested, and there appeared positive evidence that the sprouts made their way through the tissue by mechanical pressure. The experiments, in connection with the behavior of the original abnormality, led the author to believe that it is a case of the reversal of polarity in the shoots.

The breeding of tropical orchids from seeds, H. BURGEFF (*Die Anzucht tropischer Orchideen aus Samen. Jena, 1911, pp. 90; abs. in Bot. Centbl., 117 (1911), No. 25, pp. 655, 656*).—This relates to the author's attempts to germinate orchids from seeds with and without fungi (E. S. R., 23, p. 133). The methods described have as a basis the symbiotic relations of the orchid to its root fungi. The author also gives an elementary but thorough discussion of the individual cultures.

The microscopic differences between hemp and flax fiber, P. SONNTAG (*Ber. Deut. Bot. Gesell., 29 (1911), No. 10, pp. 669–671*).—Findings are given from the author's studies on the markings of the bast cells of Linum and Cannabis, which have hitherto been either neglected or pronounced structureless. He reports several characteristic differences, notably as regards their twist on being wet, which in flax was found in every case left handed, and hemp only right-handed.

FIELD CROPS.

Some principles of dry farming, L. R. WALDRON (*North Dakota Sta. Bul. 96, pp. 425–465, figs. 11*).—Discussions of the structure, mechanical composition, and texture of the soil; of moisture and its absorption and use by plants, and of the theory of the dirt mulch, are followed by a statement of the general principles to be considered when farming under dry-farming conditions. Special applications of these and other principles are made to the production of wheat, flax, oats, barley, winter grains, corn, alfalfa, and live stock.

Disking stubble at the time of harvesting in 1911, at Dickinson, apparently increased the amount of moisture found a month later in each of the first 6 ft. of soil, excepting the second foot, the net gain for the 6 ft. being 1.57 in.

Subsoiling the clay soil of the Red River Valley at the station 8 in. below a 6-in. furrow increased the yields of the last season's crop when done in the fall, but was followed by a decrease when done in the spring for the same season's crop. The increased yields were insufficient to pay for the added cost.

Photographs of the cereal yields, taken from square yard areas of plats given various cultural treatments during 1911, indicate the relative yields.

Data obtained at Dickinson in 1911 indicate the loss of soil moisture from the surface foot of soil at the rate of 10 tons per acre per day for the period from June 12 to July 1. From other data it is concluded that cultivation conserved 1.88 in. of water in the surface 6 ft. of soil between May 1 and harvest time.

Report of division of agronomy, W. C. ETHERIDGE (*North Carolina Sta. Rpt. 1911, pp. 16–21*).—These pages report the results of tests of 59 corn varieties, 39 cotton varieties, 23 fall-oat varieties, 26 varieties of cowpeas, 21 of soy

beans, 11 of Adsuki beans, and 2 of Seta beans, in addition to a considerable number of cooperative tests.

Field counts and measurements indicated that suckering of corn depended mainly upon the amount of plant food with which the main stalk was supplied. A considerable loss resulted from the removal of suckers in case of plants 30 in. apart in the row on rich land, but in case of plants 20 in. apart there was a slight gain in combined value of grain and stover. Earlier results obtained with planting at these distances have already been noted (E. S. R., 25, p. 232).

In 5 years' variety tests Purple Straw has usually stood among the 31 best wheat yielders.

In the fertilizer tests "the 1910 results are in general accord with those of former years for cotton [E. S. R., 25, p. 233], but are somewhat at variance with previous results for corn." In the case of both corn and cotton, phosphoric acid and nitrogen apparently gave better results when combined with potash. Two tons of stable manure per acre in combination with 160 lbs. of phosphate yielded over 100 lbs. more lint per acre than did 204 lbs. of phosphate rock in combination with 144 lbs. of dried blood. Peruvian guano alone applied at the rate of 250 lbs. per acre apparently about doubled the yield of cotton, while the use of 500 lbs. per acre produced more cotton by about one-fifth than the application of 250 lbs. The use of 37 lbs. of kainit, 97 lbs. of acid phosphate, 130 lbs. of nitrate of soda, and 110 lbs. of Peruvian guano was followed by more than twice as great a yield of cotton per acre as was obtained from the check plat. The use of 100 lbs. of sulphate of ammonia on June 27 apparently increased the corn yield by between 4 and 5 bu. of corn and 300 lbs. of stover per acre. When 200 lbs. of either nitrate of soda or sulphate of ammonia were applied to wheat in addition to 200 lbs. of acid phosphate and 25 lbs. of muriate of potash per acre, slightly better yields were secured than when only the phosphorus and potash were added.

In tests of solubilized organic nitrogen, potash manure, beet-refuse compound, and calcium cyanamid, none of the newer fertilizers equaled nitrate of soda, sulphate of ammonia, or dried blood in cotton lint production, but "in production of shelled corn per acre beet-refuse compound, sulphate of ammonia, calcium cyanamid, and potash manure gave better results than dried blood, solubilized organic nitrogen, and nitrate of soda."

In cooperative tests of 8 varieties of corn and 7 varieties of cotton, Sanders Improved and Biggs Seven-ear consistently stood high among corn varieties, while Toole Prolific and Cook Improved made a good showing among the cotton varieties.

The results of the third year's work seemed to indicate that corn ears grown from seed shelled from the middle of the ear had a decidedly higher shelling percentage and produced more shelled corn, but less stover, than corn taken from other parts of the ear.

[Agricultural development of Nyasaland], J. S. J. McCall (*Ann. Rpt. Dept. Agr. Nyasaland, 1911, pp. 1–13*).—The report shows a considerable increase in the area of cotton cultivated under European management, the area in 1909–10 being 8,975 acres, in 1910–11 12,752 acres, and in the present season 23,314 acres. The average yield of lint per acre was 81 lbs. in 1909–10 and 103 lbs. in 1910–11, some of the estates yielding as much as 200 lbs. per acre. The British Cotton Growing Association has given considerable assistance to the industry by providing seed for planting and guaranteeing to purchase the crop at a fixed price.

Other notes and statistics are given as to the area, yield, and value of corn, rubber, tobacco, coffee, tea, beans, etc.

Agricultural development of Nyasaland (*Bul. Imp. Inst.* [*So. Kensington*], *9* (*1911*), *No. 4, pp. 380–387*).—The data here presented are noted above.

[Field crops work at Dikopshof], K. HOFMANN and J. HANSEN (*Landw. Jahrb., 40* (*1911*), *Ergänzungsb. 1, pp. 1–129*).—This is a second report, giving a detailed statement of the work on an estate operated in connection with the Royal Agricultural Academy at Bonn-Poppelsdorf. The results of numerous variety and fertilizer tests conducted during 1908–9 are stated.

Report of the work of the Imperial Bavarian Moorculture Station, 1909, A. BAUMANN (*Landw. Jahrb. Bayern, 1* (*1911*), *No. 3, pp. 81–314*).—A report of a considerable number of variety and fertilizer tests with various crops in numerous localities.

Second annual report of the demonstration area, Bathurst experiment farm, R. W. PEACOCK (*Agr. Gaz. N. S. Wales, 22* (*1911*), *No. 11, pp. 949–960*).—Tables present the results of variety, rate of seeding, date of seeding, and other work with wheat. Other tables state in detail the cost of production and the returns secured in growing wheat, alfalfa, corn, and a fodder crop of rape and barley.

Experimental forage plats, 1910–11, T. A. J. SMITH (*Jour. Dept. Agr. Victoria, 9* (*1911*), *No. 8, pp. 553–556, figs. 2*).—A brief report of fertilizer and variety tests with corn, soy beans, millet, and broom corn in different localities is given.

Summer crops for grain and silage, western district, M. H. REYNOLDS (*Agr. Gaz. N. S. Wales, 22* (*1911*), *No. 9, pp. 762–769, pls. 2, figs. 5*).—Variety tests of corn cut for silage in a number of localities, a fertilizer test with corn and sorghum, and miscellaneous work with cowpeas, soy beans, and other crops are reported.

Revegetating experiments on depleted country, A. MACPHERSON (*Jour. New Zeal. Dept. Agr., 4* (*1912*), *No. 1, pp. 21, 22, fig. 1*).—Brief notes on tests of 26 grasses and 3 grass-seed mixtures.

Fodder plants indigenous to Australia (*Bul. Imp. Inst.* [*So. Kensington*], *9* (*1911*), *No. 3, pp. 272–280*).—The author groups the fodder plants with which he deals as grasses, Australian saltbushes, pasture herbs, and shrubs and trees. The grasses are further subdivided into those suitable for general pasture and hay, silage, cultivation for grain, winter growth, wet or undrained land, ridges and very dry soils, and those for use in binding littoral sands. Another list includes those objectionable because their sharp-pointed leaves injure the mouths of sheep or because the ripe seeds are injurious to the eyes or wool.

Breeding experiments with grasses, DIX (*Illus. Landw. Ztg., 31* (*1911*), *Nos. 98, pp. 903–905; 99, pp. 912, 913, figs. 13*).—The author states the results of 1 year's work with Italian, English, and French rye grass, and with orchard grass. A study of each showed the presence of many types and of great variation in height, rate of growth, and thickness of foliage, especially in the case of the rye grass. The numerical and other data presented in the tables deal almost entirely with the Italian rye grass *Lolium italicum*, but similar data for 1 specimen of *L. perenne* are given for comparison.

The grama grasses: Bouteloua and related genera, D. GRIFFITHS (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 14* (*1912*), *pt. 3, pp. XI+343–428, pls. 17, figs. 45*).—This botanical study of numerous species of Bouteloua and related genera describes the various species dealt with and states where herbarium specimens may be found.

Meadows and pastures, J. E. WING (*Chicago, 1911, pp. 418, pl. 1, figs. 59*).—The author states the soil and other requirements of each of a number of grasses and legumes, including cowpeas, Canada peas, and soy beans, used for

hay or grazing. Full directions for growing these crops and combating their enemies accompany suggestions on the management of pastures and meadows. Data dealing with local grasses and problems and submitted by many of the state experiment stations are appended.

Report on field trials on the manuring of seeds hay (rye grass and clover, one year's ley), 1910, E. HARRISON (*Midland Agr. and Dairy Col. Bul. 2, 1910–11, pp. 8–15, table 1*).—Tables present data secured in fertilization tests with rye grass and clover in 20 localities during the 4-year period 1907–1909. Nitrate of soda, sulphate of ammonia, superphosphate, muriate of potash, sulphate of potash, and kainit were tested in various quantities and mixtures supplying 20 lbs. of nitrogen, 25 lbs. of phosphoric acid, and 25 lbs. of potash, except that 2 plats received no potash. A table states the average yields following each of these applications.

The author concludes that a greater average profit followed the use of sulphate of ammonia than that of nitrate of soda, when both were used with superphosphate, and that the profit from sulphate of ammonia was more than 3 times as great as that from nitrate of soda when both were used with superphosphate and potash. A complete fertilizer tested gave a greater profit than an incomplete one. Muriate of potash gave more than twice as great profit as sulphate of potash when applied with sulphate of ammonia and superphosphate. In this mixture it gave somewhat greater profits when applied in March than when applied in April. In some cases kainit brought a greater profit than muriate of potash, but the results were somewhat variable.

Sulphate of potash with sulphate of ammonia and superphosphate brought about the same returns whether applied in April or in March. Muriate of potash brought somewhat greater returns when applied in March, while kainit brought more than twice as great returns when so applied. The fertilizer mixtures which the author recommends for rye grass and clover are (1) 200 lbs. kainit or (2) 50 lbs. muriate of potash each applied with 100 lbs. sulphate of ammonia and 208 lbs. superphosphate.

Hybridization investigations with oats and wheat, H. NILSSON-EHLE (*Lunds Univ. Årsskr., n. ser., Sect. 2, 5 (1909), No. 2, pp. 1–122*).—The results here described are based upon work inaugurated at Svalöf in 1900. The author discusses at some length the principles of hybridization and points out the views held by other leading investigators on this subject. The characters of which account was taken in these experiments were the color of the glumes in oats and of the spike and the kernel in wheat, the ligules and type of panicle in oats, and the type of spike in wheat. The reasons for the deductions made are given as based upon the different breeding phenomena observed, and mainly upon the principles of segregation. A list is given of the pedigreed varieties which entered into the investigation.

The investigations with oats indicated that the dark color of the flowering glumes may be brought about by 2 units which are indistinguishable qualitatively, and that small gradations of this character, capable of transmission, may be affected by the united action of different units. It is suggested that this may also be true of quantitative characters, and that the numerous transmissible gradations which certain characters show are the result of the different groupings of a comparatively limited number of units. The many transmissible gradations of the dark color in the glumes of oats, ranging from a dark chestnut brown to a light cinnamon brown, are considered as coming about either as a consequence of combinations of other characters or as the result of concerted action of independent color units.

From the results of hybridization work continued into the second and third generation, it is concluded that the black, yellow, and gray colors of the glumes

of oats represent 3 complete and independent unit characters. New color forms appearing in the crosses as observed in this breeding work were found to be new combinations of groupings of unit characters of the parents. The author states that in none of his crosses did he observe unit characters which were not present in the parents.

Work with wheat was conducted with varieties having brown and light colored heads. The crosses of spring wheat varieties in the F_3 generation showed upon the one hand the ordinary Mendelian segregation, the exceptions being apparent rather than real, and on the other hand that in such monohybrid segregations different transmissible gradations of the brown color are formed. Of 7 crosses of spring wheats with brown colored heads only one gave evidence of dihybrid segregation or of the presence of 2 unit characters with reference to the brown color, but these were not discernible from external appearance. In crosses between deep brown and white-headed forms the color of heterozygotes was always plainly brown even if reduced, and the monohybrid segregation was in the proportion of 3 brown-headed individuals to 1 of the white-headed. Crosses between light brown and white forms showed little or no brown color in the heterozygotes.

The color of the grain was studied in 5 crosses between red and white-grained varieties of wheat. Two of the crosses plainly segregated in the proportion of 3:1, and one, a cross between a white-grained variety and Swedish velvet wheat (a red-grained sort), showed a constantly red-grained strain in the second generation. These and other results in this experiment were taken as indicating with considerable certainty that the red color of the kernel in Swedish velvet wheat includes 3 independent unit characters, each one by itself capable of producing the red color in the grain. The author maintains that the differences outwardly apparent in the effect of these various units are so small that quantitatively they may be considered as practically equal, and he points out that the units clearly mendelize in the same manner. Germination experiments indicated that the pigment in the seed coat of the wheat kernel seems to retard germination when exposed to the air under conditions of temperature and moisture favoring growth.

In another series of breeding experiments a variety of yellow-glumed side oats, Jaune Géant à Grappes, which is one of the few varieties having no ligules, was crossed with several varieties provided with ligules. The results showed a definite connection between the presence of ligules and the type of panicle. In all cases the progeny in which the absence of ligules was constant was of the side-oat type, while the progeny in which ligules were present was of the spreading panicle type. It was further shown by experiment that the ligule character of one of the varieties was determined by 2 units segregating independently of each other. One of these determined the spreading type of panicle, the other a rather loose form of the side-oat type, while the absence of both units determined the compact form of side-oat head, together with the absence of ligules. In view of the results secured, the spreading panicle type is regarded as the more complicated form, brought about by the presence of unit characters more or less numerous and influencing the position of the spikelet stems. The segregation observed in the F_2 generation indicated the presence of 3 unit ligule characters in 2 varieties, and of 4 in 1 variety.

Eight crosses were made between spreading panicle and side-oat varieties to study the influence of the type of panicle as a character. It was found that 2 varieties had each a special unit determining the character of spreading panicle. In crossing these 2 varieties it is pointed out that since the presence and the absence of each unit constitutes a character pair, forms must arise in which both units are absent and this determines the side-oat type of panicle.

The combined influence of the 2 units gave a more pronounced spread to the whorls of the panicle than either of the units acting by itself.

Manuring of oats and mangels, B. DYER and E. PARKE (*Agr. Gaz. [London]*, *75 (1912)*, *No. 1985*, *p. 55*).—In a fertilizer test with oats on a heavy clay soil, poor in phosphoric acid but sufficiently rich in available potash, the highest 9 years' average yield, 66½ bu. of grain per acre, followed the use of 3 cwt. of superphosphate and 2 cwt. of nitrate of soda, as compared with 57½ bu. after 3 cwt. of superphosphate and 1 cwt. of nitrate of soda, 49¾ bu. after 3 cwt. of superphosphate alone, and 40¼ bu. on the check plant. On the same soil an application of 4 cwt. of superphosphate and 6 cwt. of nitrate of soda was followed by an 8 years' average yield of 43 tons, 11 cwt. of mangels as compared with 37 tons, 2 cwt. after the use of 4 cwt. of nitrate of soda and 4 cwt. of superphosphate; 32 tons, 1 cwt. after 2 cwt. of nitrate of soda and 4 cwt. of superphosphate; 24 tons, 15 cwt. after 4 cwt. of superphosphate alone; and 17 tons, 15 cwt. of mangels on the check plat.

Test of different rates of planting rye and potatoes, BIELER (*Illus. Landw. Ztg.*, *31 (1911)*, *No. 98*, *p. 905*).—After 2 years' tests of sowing rye at rates ranging from 40 to 70 lbs. per morgen (from 63 to 111 lbs. per acre), the author concludes that the rate of seeding may safely be reduced to 40 lbs. per morgen. In case of potatoes the use of small tubers required 500 kg. per morgen (1,743 lbs. per acre), while the use of medium and large tubers required 900 and 1,500 kg., respectively. The crop produced by the large tubers was somewhat greater in the case of 2 of the 3 varieties and somewhat higher in starch content in each case. The experiments will be continued.

Stack-building at Wagga Experiment Farm, A. F. FULLER (*Agr. Gaz. N. S. Wales*, *22 (1911)*, *No. 9*, *pp. 741–747*, *pls. 2*, *figs. 11*).—Directions are given for stacking grain in accordance with the methods followed at the Wagga Experiment Farm.

Chou moellier (*Jour. New Zeal. Dept. Agr.*, *4 (1912)*, *No. 1*, *pp. 25*, *26*, *fig. 1*).—Chou moellier stood rough and unfavorable weather better than corn, millet, soy beans, mangels, carrots, or cowpeas planted in the same field. It also did well "in a field where humus was practically nonexistent."

Productive power of red clover from different sources, P. LIEBAU (*Illus. Landw. Ztg.*, *31 (1911)*, *Nos. 24*, *pp. 233*, *234*; *25*, *pp. 246*, *247*).—A test of red-clover seed grown in England, France, Russia, Hungary, and various provinces of Germany was conducted at the Agricultural High School at Dahlem in 1909–10. Seed from each source gave a much higher yield during the second year it was grown in the new locality than during the first.

Romance of a clover, D. MCDONALD (*Gard. Chron.*, *3. ser.*, *49 (1911)*, *No. 1262*, *p. 139*).—The author notes that a plant of the strawberry clover (*Trifolium fragiferum*) accidentally introduced into the colony of Victoria proved "much more drought resisting than the ordinary species known to farmers."

Crossbreeding of maize and the Mendelian theory, G. A. PFISTER (*Jour. Nat. Hist. and Sci. Soc. West Aust.*, *3 (1911)*, *No. 2*, *pp. 98–101*).—The author reports the results of some experiments in crossing maize for the purpose of securing a type adapted to ensilage purposes. Although he does not regard maize as a suitable plant for Mendelian experiments, he states that the parent plants in this case were from seed which had proved constant through many generations, and that fertilization took place in separate rooms, where there was no possibility of casual pollination through wind by other maize plants.

The varieties used were White American Horsetooth (W. H.), Ninety Days maize (N. D.), and Peruvian maize (P. M.). In the first crosses, W. H.×N. D. and W. H.×P. M., W. H. proved dominant and the other varieties recessive. The F_1 generation of the W. H.×N. D. cross was an early ripening variety of

medium height, long leaf, and white seed, and of the F_2 generation the W. H. N. D. variety was most promising.

In the F_2 generation of the W. H.×P. M. cross the author considered the P. M. W. H. variety most promising. It was very prolific and the kernels, which ripened rather late, were blue-gray in color.

The F_1 generation of a W. H. N. D.×P. M. W. H. cross consisted of tall, single stalked, early ripening, prolific plants with white, blue-gray, yellow, and brown kernels, while in the F_2 generation there appeared a number of plants which proved on further breeding to be P. M. W. H. W. H. N. D. A new characteristic of this hybrid was its millet-like stooling, because of which it produced a greater amount of green fodder. In the F_1 generation about 75 per cent of the kernels of 60 ears were white, and 25 per cent dark, indicating the dominance of white.

This hybrid did not breed true, as typical P. M. specimens appeared. In 1909, when cultivated in a very hot, dry climate where irrigation was necessary, 6 out of the 20 plants grown stooled out and produced both male and female flowers, and 13 produced only 1 stalk, each bearing the male flower only, while 1 bore the female flower. The author does not regard this phenomenon as explainable by Mendelian methods, but attributes it to the abnormally high temperature, which caused the male flower to develop earlier.

A progress report is given of work with the lupine and Sturt pea (*Clianthus dampieri*).

Maize at Bathurst Experiment Farm, R. W. Peacock (*Agr. Gaz. N. S. Wales, 22 (1911), No. 11, pp. 961–966, figs. 4*).—These pages describe in detail the cultural methods by which corn was produced at a cost of 2s. 3d. per bushel. A table states the results of a variety test and gives the dates of tasselling and ripening of the varieties tested.

Maize fodder experiments on the south coast, R. N. Makin (*Agr. Gaz. N. S. Wales, 22 (1911), No. 9, pp. 759–761*).—These pages state the results of fertilizer and variety tests with corn in 8 different localities.

A cotton variation with a self-fertilized ancestry, S. M. Bain (*Amer. Breeders Mag., 2 (1911), No. 4, pp. 272–276, figs. 2*).—Seed of a typical plant of the Tennessee Greenseed cotton was taken in 1905 from within 4 miles of the Mississippi River in Lauderdale County, to the experiment station at Knoxville, Tenn. Local adjustment variations, similar to those previously noted (E. S. R., 22, p. 36), were observed. The progeny of the selected plant showed no apparent deterioration in vigor after 4 generations of self-fertilization secured by bagging. In 1910, 3 rows grown from the seed saved from a single plant in 1909 showed a distinct variation from the remainder of the crop. "Every plant in these 3 rows was stout, strict in habit, and at least a third taller than its cousins in the other rows. Moreover, the crop was quite late in maturing." The seed was distinctly larger than that of the other rows, and tended toward smoothness or absence of tuft.

[Cotton on the experimental farms of Bengal, 1910–11], C. Sherrard (*Dept. Agr. Bengal, Quart. Jour., 5 (1911), No. 2, pp. 59–64*).—These pages report the results of variety tests. Among 10 tests for which the financial returns of cotton growing are stated, 2 resulted in profits and 8 in losses.

Cotton growing in Sind (*Bul. Imp. Inst. [So. Kensington], 9 (1911), No. 3, pp. 217–227*).—During the years 1909 and 1910 the department of agriculture of the Bombay Presidency has conducted extensive tests of American Upland and other varieties of cotton in Sind. The author regards American Upland cotton of several varieties as very promising. Brief notes are given on samples of Egyptian Mitafifi and Egyptian Abassi samples produced, and on samples of

the American Upland varieties Triumph, Peterkin, Toole, Griffin, Black Rattler, and Allen Improved Long Staple.

Proceedings of the cotton production commission of the colonial agricultural committee (*Verhandl. Kolon. Wirtschaftl. Kom., 1911, No. 2, pp. 98, pls. 3, figs. 2*).—This report outlines the status of cotton enterprises in the German colonies, reviews the cotton market and industry, and reports briefly the proceedings of a convention of textile workers in Berlin. Separate chapters deal with cotton substitutes, particularly kapok, and with estimates given by commercial authorities of the value of samples of fiber crops in various countries.

Guar (*Agr. Gaz. N. S. Wales, 22 (1911), No. 11, p. 1000*).—A brief statement of the results of rather unsuccessful tests of guar (*Cyamopsis tetragonoloba*) at 3 different experimental farms.

Trials of varieties of kale (*Agr. Gaz. N. S. Wales, 23 (1912), No. 1, pp. 36–38*).—These pages state the results of tests of the yielding power and feeding value for various animals of borecole, Chinese kale, chou moellier, and other similar crops. The tests were conducted on 4 different farms.

Report on field trials with varieties of mangels in 1909, T. Milburn (*Midland Agr. and Dairy Col. Bul. 3, 1909–10, pp. 27–39*).—This is a report of a variety test of mangels conducted in 1909, 8 varieties being tested in each of 7 localities. The methods followed are briefly stated and the data obtained presented by means of tables, which state both the total yields and the percentage of dry matter.

Field trials with varieties of mangels in the year 1910, E. Harrison (*Midland Agr. and Dairy Col. Bul. 5, 1910–11, pp. 27–34, table 1*).—Results of the sixth years' test of different varieties grown in each of 6 localities during 1910 are reported.

Report on field trials on the manuring of mangels in the year 1910, E. Harrison (*Midland Agr. and Dairy Col. Bul. 4, 1910–11, pp. 23–26, table 1*).—This is a report of the results secured during the third year of fertilizer tests with mangels, a 12-plat experiment being carried on in each of 3 localities. The author regards the data as indicating clearly that a fertilizer mixture for mangels must contain nitrogen, soluble phosphates, potash, and common salt. The highest average profit followed the use of 130 lbs. of nitrate of soda at thinning and 100 lbs. of sulphate of ammonia, 750 lbs. of phosphate, and 120 lbs. of potash at seeding time. A March application of 2½ cwt. of common salt is recommended with the above mixture.

Report on field trials on the manuring of mangels in 1908 and 1909, J. F. Blackshaw (*Midland Agr. and Dairy Col. Bul. 5, 1909–10, pp. 51–57*).—This is a report of the first 2 years' trials in the work noted above.

Varieties of oats, C. C. Bedfordshire (*Abs. in Jour. Bd. Agr. [London], 18 (1912), No. 10, p. 859*).—The yields secured in 1911 and 5 previous years in a variety test of oats are reported. A high percentage of grain was found usually to accompany high weight.

Pea variety trials, G. de S. Baylis (*Jour. New Zeal. Dept. Agr., 4 (1912), No. 1, pp. 43–45*).—The results of fertilizer tests of peas on different soils and a number of farms are given, together with notes on the varieties used.

Electrical treatment of crops, Miss E. C. Dudgeon (*Abs. in Jour. Bd. Agr. [London], 18 (1912), No. 10, pp. 862, 863*).—This article reports the results of work on 8 acres of potatoes in 1911. Electrical treatment was applied by means of the Lodge-Newman high-tension discharge apparatus. The potatoes were planted during the third week in April and the discharge applied about 4 hours per day from May 1 until August 18, or 413 hours in all. On dull days it was

applied both morning and afternoon, but on bright days 1, 2, 3, or 4 hours in the afternoon.

Four varieties were tested and each showed an increase in yield. The increases ranged from 13 cwt. to 2 tons, 4 cwt. per acre. The total cost of applying the treatment was £5 19s. 6d., but the same expense would have covered the cost of electrifying 15 acres instead of 8.

Report on field trials with potatoes in 1909, F. WAKERLEY (*Midland Agr. and Dairy Col. Bul. 6, 1909–10, pp. 59–62*).—In view of the general impression that Scotch and Irish seed potatoes are superior to those locally grown because of the fact that they are harvested before reaching complete maturity, this work was undertaken to determine the effect of harvesting September 1, October 1, and November 6. Potatoes harvested on these dates were planted on 2 farms, but there was little difference in the yields. The author regards it as significant, however, "that one station showed a slight superiority of the early lifted seed, and the other gave the most disease and chats from the late lifted ones."

Results of field trials on the manuring of potatoes in 1910, F. WAKERLEY (*Midland Agr. and Dairy Col. Bul. 3, 1910–11, pp. 16–22, table 1*).—These trials were conducted in 5 different localities for the purpose of comparing 1½ cwt. of sulphate of ammonia, 2 cwt. nitrate of soda, 267 lbs. nitrate of lime, 188 lbs. calcium cyanamid, and 387 lbs. of fish meal with 2 proprietary fertilizers. Each supplied 35 lbs. of nitrogen, and was applied in conjunction with 4 cwt. superphosphate and 1½ cwt. sulphate of potash, except in case of the proprietary mixtures.

The greatest increases in profit followed the use of sulphate of ammonia and calcium cyanamid.

Work of the German potato station in 1911 (*Deut. Landw. Presse, 39 (1912), Nos. 14, pp. 150, 151; 15, pp. 164, 165*).—Variety tests conducted in 1911 with special reference to starch content and disease resistance are reported.

Potato experiments in Northwest district, A. H. E. MCDONALD (*Agr. Gaz. N. S. Wales, 22 (1911), No. 10, pp. 881–885*).—Notes are given on the earliness and other qualities of 9 varieties of potatoes which were tested in 3 different localities. A table states the yields secured.

At each center an application of 4 cwt. of sulphate of ammonia, 13 cwt. superphosphate, and 3 cwt. sulphate of potash was followed by a greater profit than an application of 8 cwt. dried blood, 8 cwt. superphosphate, and 4 cwt. of sulphate of potash. Each of these mixtures was applied at the rate of 4 cwt. of the mixture per acre.

The danger of using foreign potatoes for seed, W. STUART and W. A. ORTON (*U. S. Dept. Agr., Bur. Plant. Indus. Circ. 93, pp. 5*).—The authors state that foreign potatoes should not be used for seed because of the danger of introducing the leaf-curl disease from Germany or the black-scab or wart disease from England.

This Department has tested over 100 foreign-grown varieties and the results during their first year show lower yields than the best American varieties. American growers and seedsmen have corroborated these results. The few foreign varieties that proved fairly satisfactory required from 2 to 3 seasons for acclimation.

[Variety and manurial experiments with sugar cane], J. P. D'ALBUQUERQUE and J. R. BOVELL (*Rpt. Agr. Work Barbados, Imp. Dept. Agr. West Indies, 1908–1910, pp. 4–109*).—This report is largely made up of tables stating the results of variety and fertilizer tests conducted during the period 1908–1910. Experiments along the same lines have been conducted for considerable periods, and the summary of results presented here are in harmony with those which have already been noted (E. S. R., 24, p. 542).

Sulphate of ammonia gave 2.31 tons and nitrate of soda 1.31 tons of cane more per acre than calcium cyanamid, when all were applied at such rates as to supplying 60 lbs. of nitrogen per acre.

Experiments conducted to ascertain the effect, if any, of cutting out dead hearts resulted in a yield of 672 lbs. of sugar cane less when the dead hearts were cut out than when they were allowed to remain.

Seedling canes and manurial experiments for the season 1909–1911 (*Local Dept. Agr., Barbados, Seedling-Canes and Manurial Expts., 1909–1911, pp. 65*).—This gives a fuller report of the sugar-cane work referred to above, and summarizes the results of 18 years' manurial experiments at Dodds.

Better results were obtained by planting cuttings made from plant canes than when cuttings from first ratoon canes or seventh ratoon canes were used or when the small cuttings were used from these 3 tests.

[Variety and manurial tests with sugar cane], H. H. Cousins (*Rpt. Jamaica Sugar Expt. Sta., 3 (1908–1910), pp. 1–107, pls. 11*).—This is a report of the results of manurial and variety tests conducted on a number of estates.

Manurial experiments, F. Watts et al. (*Imp. Dept. Agr. West Indies, Sugar-cane Expts. Leeward Isl. 1909–10, pt. 2, pp. 35, pls. 2*).—This is a detailed report in tabular form of a continuation of manurial tests with sugar cane at Antigua and St. Kitts, already noted (E. S. R., 21, p. 540).

Experiments with varieties of sugar cane, F. Watts et al. (*Imp. Dept. Agr. West Indies, Sugar-cane Expts. Leeward Isl. 1909–10, pt. 1, pp. 87*).—This is a similar report of the results of variety tests with plant and ratoon canes, in continuation of work already noted (E. S. R., 21, p. 540).

Report on field trials with varieties of swedes in 1909, T. Milburn (*Midland Agr. and Dairy Col. Bul. 8, 1909–10, pp. 73–80*).—This is a report of the third year's results in a variety test of swedes. Ten varieties were tested in 4 different localities. The author does not regard any variety as having shown special merit, although satisfactory yields were given by most of the varieties. Their dry matter percentages ranged from 7.95 to 9.

Results of field trials on the manuring of swedes in the year 1910, E. E. Stokes (*Midland Agr. and Dairy Col. Bul. 7, 1910–11, pp. 43–47, table 1*).—Six years' work have indicated that the most profitable fertilizer for swedes is 150 lbs. sulphate of ammonia, 500 lbs. superphosphate, and 60 lbs. sulphate of potash. Sulphate of ammonia proved a more profitable nitrogen source than nitrate of soda, and superphosphate proved more profitable than dissolved bones, bone meal, or basic slag. Sulphate of potash excelled both kainit and muriate of potash.

A new series of experiments was conducted on the 11 plats at each of 5 centers during 1910. One of its minor objects was the testing of nitrate of lime as a nitrogen source. Although the author regards it as misleading to draw conclusions at this stage, he states in full the yields and other data secured in this test. The greatest average profit per acre in 4 of the localities followed the use of (1) 230 lbs. nitrate of lime, 500 lbs. superphosphate, and 60 lbs. sulphate of potash, and (2) 250 lbs. Charleston phosphate alone.

Results of field trials on the manuring of swedes in 1909, T. Milburn (*Midland Agr. and Dairy Col. Bul. 4, 1909–10, pp. 41–49*).—The results of work begun in 1904 are summarized, including the sixth year's work.

Types of Cuban tobacco, H. Hasselbring (*Bot. Gaz., 53 (1912), No. 2, pp. 113–126, pls. 7*).—The author finds that the tobacco grown in Cuba consists of a mixture of a large number of forms which maintain their characteristics from generation to generation. The crop in any one field lacks uniformity and the plants show a bewildering variety of forms among which some types predom-

inate. It is not, however, possible to delimit the groups definitely, or to group all the plants by a mere taxonomic study.

As a result of cultural experiments the author concludes that pure strains which breed true to type can be selected and that such strains do not break up into new types when grown in northern climates. After modifications appear, they appear in all plants of a strain alike. Notes are given on a number of types of the *macrophylla* and *havanensis* groups.

Field experiments with wheat, F. DITZELL (*Agr. Gaz. N. S. Wales, 23 (1912), No. 1, pp. 13–22*).—These pages record the results of fertilizer tests with wheat at the Cowra Experiment Farm during the 4-year period 1907–1910. Applications of sulphate of ammonia, superphosphate, and sulphate of potash singly and in various mixtures and amounts were tested on plats (1) planted continuously to wheat, (2) after bare fallow, and (3) planted to wheat after a fodder crop. The work along each of these lines was further subdivided to include tests of the effect upon the yielding power of the land of methods of harvesting the crop.

On the land planted to wheat each year, burning the straw, plowing it under, and removing it with a binder were followed by average yields of 22.78, 20.88, and 19.27 bu. per acre, respectively, as compared with 28.07, 27.66, and 27.07 bu. per acre, respectively, were planted in alternation with bare fallow, and 28.72 27.97, and 27.97 when wheat was planted in alternation with fodder crops. Tables state in full the numerical data from these tests, grouped to bring out a number of different comparisons.

Wheat manurial trial, Cowra Experiment Farm, 1910, F. DITZELL (*Agr. Gaz. N. S. Wales, 22 (1911), No. 11, pp. 922–925*).—In a fertilizer test with wheat the applications used, in the order of their merit, were (1) superphosphate, (2) dried blood, (3) sulphate of potash, (4) dried blood and superphosphate, (5) sulphate of ammonia, superphosphate, and sulphate of potash, (6) superphosphate and sulphate of potash, (7) dried blood, superphosphate, and sulphate of potash, and (8) dried blood and sulphate of potash.

Development of wheat production in Canada, A. L. BISHOP (*Bul. Amer. Geogr. Soc., 44 (1912), No. 1, p. 10–17*).—These pages trace the development of wheat growing in Canada since 1871, each province being treated separately. A table states the wheat yields and the number of acres devoted to wheat in Manitoba, Saskatchewan, and Alberta in 1900 and each year during the period 1906–1910, and the acreage for 1911. Estimates of the possible future extension of the wheat acreage in Canada are given.

The wheat varieties of Alsace-Lorraine and neighboring countries, E. H. L. KRAUSE (*Landw. Jahrb., 41 (1911), No. 3–4, pp. 337–371, fig. 1*).—The author states briefly the principal characters and the history of each of 13 wheat varieties. There is a separate bibliography for each variety, and numerous foot notes give citations to the sources of information summarized.

Seed inspection (*Maine Sta. Off. Insp. 36, pp. 12*).—The chief requirements of the law regulating the sale of seeds in Maine are stated, and the results of the 1911 inspection are reported much as in earlier years (E. S. R., 22, p. 638; 24, p. 640).

"There has been a very remarkable improvement in the quality of grass seed which is handled, and there were practically no violations of the law in this State in 1911."

Small seed improvement, G. M. FRIER and LOVINA S. MERICK (*Indiana Sta. Circ. 31, pp. 15, figs. 5*).—This circular describes the work of the branch seed laboratory of the extension department and reports results to July 1, 1911.

From analyses of 2 samples each of high and low grade red clover, alfalfa, and timothy seed it appeared that the average cost per bushel of pure seed

that would grow in the case of high and low grade red-clover seed was $10.15 and $27.53 per bushel, respectively, $13.12 and $19.66, respectively, in case of alfalfa seed, and $2.62 and $3.17 in case of timothy seed.

Sale of seeds in Canada (*Abs. in Jour. Bd. Agr. [London], 18 (1912), No. 10, pp. 870, 871*).—This contains a statement of the standards fixed by the Canadian seed control act of 1911 for certain grades of timothy, red clover, alsike clover, and alfalfa seed, or any mixture containing them.

Canadian Seed Growers' Association (*Canad. Seed Growers' Assoc. Rpt., 7 (1911), pp. 124, pls. 3, figs. 2*).—This contains the minutes of the seventh annual meeting and the papers and addresses presented. One of these papers presents a résumé of plant breeding in Sweden, dealing with results obtained at Svälof.

The viability of weed seeds after passing through the digestive tract of farm animals, E. Korsmo (*Tidsskr. Norske Landbr., 18 (1911), No. 5, pp. 223–230*).—The literature on the subject is reviewed, and an account is given of original experiments in feeding weed seeds to a horse, a cow, and a hog. The percentages of viable seeds of different kinds of weeds that were found in the feces were as follows: Sorrel (*Rumex acetosella*), 26.4, 70.6, and 5 per cent for the horse, cow, and hog, respectively; lamb's quarters (*Chenopodium album*), 2.5, 16.3, and 20.4 per cent; chamomile (*Matricaria inodora*), 10.4, 24, and 0.02 per cent; *Rumex domesticus*, 23, 90.4, and 11.3 per cent; bird rape (*Brassica campestris*), 5.1 and 2.2 per cent for the horse and cow, respectively; stinkweed (*Thalaspi arvense*), 37 per cent, and wild mustard (*Sinapis arvensis*), 5.4 per cent for the horse; and ox-eye daisy (*Chrysanthemum leucanthemum*), 7.5 per cent for the cow.

Iron sulphate and lime nitrogen for weed eradication, S. Rhodin (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 6, pp. 433–445, figs. 2; Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 40, pp. 15, figs. 2*).—Iron sulphate in solution proved preferable to lime nitrogen in the form of powder for the eradication of mustard and mullen. Lime nitrogen was found to be a sure and strong poison for mullen, and did not injure oats when applied as a powder any more than iron sulphate in solution. Barley, however, is very sensitive to lime nitrogen, and if a long, dry warm period should follow the application it would be likely to be injured or at least retarded in its development.

A series of plats was seeded with oats which contained 5 per cent white mustard seed and treated with iron sulphate, lime nitrogen, and hand cultivation. The grain yields resulting were 1,740, 1,830, and 1,600 kg. of grain per hectare, respectively, as compared with 950 kg. on the check plat. The straw yields varied in the same order, except that the check plat excelled all the others. The mustard-seed yields were 178, 348, and 828 kg. per hactare, respectively. The profit arising from the treatment was 30 crowns per hectare ($3.25 per acre), as compared with 68.1 and 71.32 crowns per hectare, respectively, in case of treatments with iron sulphate and lime nitrogen.

Similar treatment of a natural weed flora on a marshy soil was followed by yields of 2,640, 2,871, and 2,356 kg. of oats per hectare after hand cultivation iron sulphate, and lime nitrogen, as compared with a yield of 1,812.5 kg. per hectare on the check plat. The total wheat yields were 67.5, 104, and 43 kg. per hectare, as compared with 367 kg. on the check plat. The estimated profits in this test were 69.67, 114.55, and 26.05 crowns per hectare, respectively.

Canada thistle and its eradication, A. G. Johnson (*Indiana Sta. Circ. 32, pp. 12 figs. 3*).—This circular gives the text of the Indiana laws pertaining to the Canada thistle and gives directions for the eradication of this pest.

HORTICULTURE.

Report of the work of the experiment station for the years 1907–8 for the destruction of the San José scale, etc., J. H. STEWART ET AL. (*West Virginia Sta. Rpt. San José Scale, etc., 1907–8, pp. 64, pls. 19, fig. 1*).—This contains a report of the director on the work and expenditures of the station for the biennium ended September 30, 1908, under the provisions of the state law for the destruction of the San José scale and other insect pests and for the promotion of horticulture, results of nursery inspections, and a reprint of Bulletin 113 and of portions of Bulletins 110 and 116, previously noted.

Report of the work of the experiment station for the years 1909–10 for the destruction of the San José scale, etc., J. H. STEWART ET AL. (*West Virginia Sta. Rpt. San José Scale, etc., 1909–10, pp. 208, pl. 1, figs. 70*).—Data similar to the above are presented for the biennium ended September 30, 1910, including special articles for the most part abstracted elsewhere in this issue, and reprints of Bulletins 117, 119–123, and 126–128, previously noted.

Insecticides and fungicides, R. HARCOURT and H. L. FULMER (*Ontario Dept. Agr. Bul. 195, 1912, pp. 40*).—A revised edition of Bulletin 154 of the same series (E. S. R., 18, p. 853) in which recent information relative to insecticides and fungicides has been incorporated.

The red sunflower, T. D. A. COCKERELL (*Pop. Sci. Mo., 80 (1912), No. 4, pp. 373–382, figs. 4*).—The author discusses the progeny of a red sunflower which was discovered in Colorado in 1910 and later crossed with other forms.

Tomatoes, A. G. TURNEY (*Ontario Dept. Agr. Bul. 196, 1912, pp. 32, figs. 9*).—This comprises a reprint of a previous report on the tomato industry of Ontario (E. S. R., 21, p. 333).

Yams, O. W. BARRETT (*Philippine Agr. Rev. [English Ed.], 5 (1912), No. 2, pp. 67–74, pls. 2*).—A brief descriptive account of yams relative to their habit of growth, method of culture, and importance as a food.

Apple orcharding in Ontario (*Ontario Dept. Agr. Bul. 194, 1911, pp. 64, figs. 47*).—A popular treatise with special reference to Ontario conditions. The phases discussed include selection of varieties, site, soils and their preparation, setting out an orchard, the management of a young orchard, cover crops, maintaining the fertility, pruning, reclaiming old neglected orchards, spraying, poisons, cost of spraying, top grafting, sun scald, thinning, picking, marketing, cooperative fruit growers' associations, packages and packing, inspection and sales regulations, profits, keeping accounts, and cold storage.

Diseases of apple trees and fruit caused by fungi and insects, J. L. HEWITT and P. HAYHURST (*Arkansas Sta. Bul. 109, pp. 409–445*).—This is a popular treatise on the most important fungus and insect pests affecting the apple industry, including methods of control. The subject matter is based in part upon original work of the station and in part upon recent literature.

State bog report, H. J. FRANKLIN (*Ann. Rpt. Cape Cod Cranberry Growers' Assoc., 24 (1911), pp. 16–28*).—This comprises a progress report on the construction of the state experimental cranberry bog at Wareham, Mass., together with a report on experimental work now under way. The investigations during the past season have dealt principally with insects (see p. 857), fungus diseases, fertilizers, weather observations, and pollination of the cranberry blossom.

Experiments in cross pollination indicate thus far that bees are necessary to the successful fruiting of the cranberry and that a pink coloring of the blossom may be an index to the failure of pollination. Since a small number of pink blossoms fruited, however, the possibility that pollination may take place to some extent after the blossom has taken on the abnormal pink color is also suggested. An examination of a considerable number of varieties on a large

number of bogs indicates that within certain limits failure to fruit is a varietal characteristic. It is concluded that it pays to keep hive bees in cranberry bogs during the blossoming season in years when wild bees are not plentiful. Breeding work is being conducted to secure a more prolific variety of cranberry than is at present known.

General observations are also made relative to indirect water injury, the setting of the blossoms, and the failure of fruit to mature from apparently normal pollinated young berries. It was observed that contrary to the general impression many top blossoms matured fruit.

Cranberry bog construction for Wisconsin, O. G. MALDE (*Wisconsin Sta. Bul. 213, pp. 3–24, figs. 20*).—The author outlines the chief requirements for success in cranberry culture and describes in detail the methods of constructing and planting a cranberry bog. The subject of cranberry bog management in Wisconsin is to be treated in a later bulletin.

A study of the arsenic content of grapes and wine, MATHIEU (*Ann. Falsif., 5 (1912), No. 40, pp. 78–80*).—Analyses were made of grapes and wine from vines treated with arsenical sprays and from untreated vines.

Traces of arsenic were found in the grapes and wine from the untreated vines. Although slightly higher amounts were found in the treated products, the analyses in which the maximum quantity was found showed an arsenic content of only 0.05 mg. per kilogram of fresh grapes, or 0.05 gm. per liter of wine. Arsenical treatment during a season when the conditions are favorable for the distribution of the arsenic appears to increase slightly the arsenic content of the products.

The avocado in Florida, its propagation, cultivation, and marketing, P. H. ROLFS (*Fla. Grower, 5 (1911), No. 5, p. 3*).—A brief popular account in which, in addition to the phases mentioned in the title, the author points out that the avocado has some severe diseases. One of the most common is due to a probably undescribed species of Glœosporium, which attacks the leaves and also the fruit in various stages of development.

Spraying with Bordeaux on the first appearance of the trouble appears to control it without much difficulty.

The mango, P. J. WESTER (*Philippine Bur. Agr. Farmers' Bul. 18, 1911, pp. 60, pls. 9*).—A treatise on the mango with special reference to its culture in the Philippines.

General consideration is given to the nomenclature, origin, geographical distribution, bibliography, and botany of the mango. The Philippine and fiberless Indian varieties are described and the methods of propagation and cultivation are discussed in detail. Other phases discussed include the composition and uses of the fruit, other uses of the mango, marketing, the embryony of the mango, breeding, diseases, insects affecting the mango, insect control, spraying, and fumigation, with formulas for fungicides and insecticides.

The embryony of the mango, P. J. WESTER (*Philippine Agr. Rev. [English Ed.], 5 (1912), No. 2, pp. 80–82, pl. 1*).—The author points out the relation between the monoembryonic character of the seed of many cultivated mangoes and the failure of these varieties to reproduce the type.

Irises, W. R. DYKES (*London and Edinburgh, [1912], pp. XIII+110, pls. 8*).—In this work the author gives a short account of the structure of the iris plant and of the groups into which the genus may be conveniently divided, describes the leading characteristics and requirements of the several cultivated species, and gives suggestions including cultural information relative to the utilization of irises in the rock garden and in the herbaceous border.

An iris calendar showing the planting season and time of flowering of different species is also given.

Making a rose garden, H. H. SAYLOR (*New York, 1912, pp. 53, pls. 8, fig. 1*).—A popular concise treatise on rose growing.

Saxon gardening, H. KOCH (*Sächsische Gartenkunst. Berlin, 1910, pp. XVI+407, pls. 13, figs. 300*).—A historical account of architectural and landscape gardening in Saxony.

Part 1 deals with the architectonic garden, consideration being given to the Saxon landscape, ancient gardening, and gardening during the renaissance, baroque, and rococo periods. In part 2 the landscape garden is considered relative to the transition period, sentimental and romantic effects, and the attempts to secure landscape effects.

An extensive bibliography of European literature on ornamental gardening is included.

FORESTRY.

On the economic principles that should govern forestry, E. ANDERSSON (*Skogsvårdsför. Tidskr., 1911, Allmänna Delen, Nos. 7, pp. 285–332, figs. 3; 12, pp. 434–440*).—This comprises an address on the general principles of forestry with a discussion following.

Forest preservation, H. S. GRAVES (*Ann. Rpt. Smithsn. Inst., 1910, pp. 433–445, pls. 7*).—A survey of the progress made in the United States during the past 10 years with reference to forest preservation.

Forest conditions in western North Carolina, J. S. HOLMES (*N. C. Geol. and Econ. Survey Bul. 23, 1911, pp. 111, pls. 8*).—This comprises the results of a cooperative study undertaken by the North Carolina Geological and Economic Survey and the Forest Service of this Department.

The region as a whole is considered relative to its physiographic features, accessibility, classification and valuation of land, forest distribution by types and by species, the timber industries, and transportation. The forest and economic conditions in each county are discussed and recommendations are also given relative to the proper management and protection of forest holdings, including a brief account of forestry on the Biltmore estate.

On the distribution of forest trees in Karafuto (Saghalin), T. MIYAKE (*Trans. Sapporo Nat. Hist. Soc., 2 (1907–8), No. 1–2, pp. 93–102*).—A descriptive account, including a list of 48 forest trees occurring in Karafuto.

Results of direct seeding in the Black Hills, J. MURDOCK, Jr. (*Forestry Quart., 10 (1912), No. 1, pp. 27–32*).—A brief account of experimental forest seedings made in the Black Hills during the period 1905–1910, including summarized data showing the species and method used, extent of each area, quantity of seed, and cost per acre.

On the importance of different methods for determining the germination power of conifer seeds, G. SCHOTTE (*Skogsvårdsför. Tidskr., 1911, Fackafd., No. 12, pp. 423–457; Meddel. Stat. Skogsförsöksanst. (Mitt. Forstl. Vers. Anst. Schwedens), 1911, No. 8, pp. 245–279*).—A comparison of different forms of germination apparatus, with discussions of the factors that influence the results obtained in the germination of tree seeds.

A bibliography of the subject is appended.

New tools for transplanting conifers, W. H. MAST (*Forestry Quart., 10 (1912), No. 1, pp. 3–8, pls. 3*).—Some transplanting tools, which have been evolved at the Halsey nursery on the Nebraska National Forest, are described and illustrated.

Method of taking impressions of year rings in conifers, L. S. HIGGS (*Forestry Quart., 10 (1912), No. 1, pp. 1, 2, pl. 1*).—A method of recording annual rings on white blotting paper is here illustrated and described.

Reproduction of lodgepole pine in relation to its management, N. C. Brown (*Forestry Quart., 10 (1912), No. 1, pp. 17–23, pl. 1*).—A paper on this subject based on data secured on the National Forests of southwestern Montana.

Yield tables for pine, A. Maass (*Skogsvårdsför. Tidskr., 1911, Fackafd., No. 12, pp. 375–422, figs. 13; Meddel. Stat. Skogsförsöksanst. (Mitt. Forstl. Vers. Anst. Schwedens), 1911, No. 8, pp. 197–244, figs. 13*).—Yield tables for pine constructed by the author are given and discussed.

The red beech: Economic and statistical investigations of the forest division, Eberswalde Forest Research Station, A. Schwappach (*Die Rotbuche: Wirtschaftliche und statische Untersuchungen der forstlichen Abteilung der Hauptstation des forstlichen Versuchswesens in Eberswalde. Neudamm, 1911, pp. VI+231, pls. 7*).—Part 1 of this report comprises the statistical results of long-continued investigations relative to the influence of various degrees of thinning and of crown density on increment development of beech stands. The author points out that the data as a whole serve to show the need and utility of combining statistical investigations with silvicultural research.

Part 2 contains yield tables based on data secured from pure beech stands, which have been under investigation for the past 30 years. Part 3 reports a study relative to the revenue-yielding capacity of beech forests. The appendix contains calipering tables both for thinning and yield-experimental areas.

A similar study of the pine has been previously noted (E. S. R., 20, p. 644).

The host plants of the sandal tree, M. Rama (*Indian Forest Rec., 2 (1910), No. 4, pp. 159–207, pls. 8*).—This embraces the results of a study of the host plants of the sandal tree (*Santalum album*) undertaken to ascertain which species of plants the tree likes best and which of them help to produce the largest quantity and the best quality of scented wood.

After having presented evidence of the complete dependence of the sandal tree on other species of plants for its nourishment, the author outlines the nature of the investigations; enumerates the different species of plants, the roots of which were found to have been attacked by sandal roots, including a brief description of the extent and nature of the attack, etc.; and points out the association of the sandal with other species, the roots of which have not yet been examined. No definite conclusion has been drawn thus far as to the best host plants for the sandal tree.

A list of associates of the sandal tree in its natural habitat and elsewhere is appended.

Vitality of rubber seed, F. G. Spring (*Agr. Bul. Straits and Fed. Malay States, 3. ser., 1 (1912), No. 2, pp. 1–4*).—A test made of the vitality of seeds from tapped and untapped Hevea rubber trees shows that the seeds from untapped trees averaged 50 per cent higher in germination than those from tapped trees. Tapping appears to lessen the weight and size of the seeds, as well as to reduce their germinating power. It is concluded that seeds intended for export should be selected from untapped trees.

A large number of seeds were coated, respectively, with beeswax, hard paraffin, and vaseline to determine the preserving effects of these substances. Seeds coated with beeswax showed an increased germination of about 30 per cent over the uncoated seeds. Seeds coated with hard paraffin gave better results than untreated seeds, but not so good as those coated with beeswax. The seeds treated with vaseline did not germinate. In no case was there apparent a large falling off in germinating power from the third to the tenth week.

Rubber (*Rev. Écon. Internat., 9 (1912), I, No. 2, pp. 227–350*).—A symposium containing the following articles relating to the rubber industry: Rubber Yielding Species, by E. De Wildeman (pp. 239–258); Rubber Culture, by P. Van Romburgh (pp. 259–275); The Financial Evolution of the Rubber Industry, by

E. L. Vincent (pp. 276–303); Commerce in Rubber, by H. Wright (pp. 304–324); and Industrial Use of Rubber, by G. Lamy-Torrilhon (pp. 325–350).

DISEASES OF PLANTS.

Bacterial diseases of plants, M. C. POTTER (*Jour. Agr. Sci., 4 (1912), No. 3, pp. 323–337*).—This is a paper read before the British Association for the Advancement of Science as an introduction to the discussion of plant diseases due to bacteria, in which the author gives a general description of the pathogenic properties of some of the more typical forms.

Plant diseases and crop rotation, H. L. BOLLEY (*Northwest. Miller, 89 (1912), Nos. 10, pp. 565, 566, 585, figs. 4; 11, pp. 623, 624, 641, 642, figs. 4*).—This is a discussion of the relation of certain fungi causing diseases of cereals, flax, etc., to their host plants, and the necessity of crop rotation to avoid continued loss is pointed out. Previous accounts of the author's work along this line have been noted elsewhere (E. S. R., 25, p. 649).

Notes on vegetable pathology, E. GRIFFON and A. MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 1, pp. 47–67, figs. 3*).—After giving a discussion of a disease of the Christmas rose, *Helleborus niger*, ascribed to *Coniothyrium hellebori*, brief reports and discussions are given of various plant diseases and their progress during 1910.

Notes on vegetable pathology, E. GRIFFON and A. MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 4, pp. 469–475*).—The authors state that the tumescent growths observed on melons, celery, and garden sorrel near Nantes and ascribed by E. Marchand to the presence of *Plasmodiophora brassicæ* are really caused by *Heterodera radicicola*. They also give brief notes on certain diseases of the pine, olive, and pear.

Plant diseases of 1909–10, N. J. GIDDINGS (*West Virginia Sta. Rpt. San José Scale, etc., 1909–10, pp. 49–52*).—Brief notes are given on a number of diseases observed upon apples, cherries, grapes, peaches, pears, plums, potatoes, etc.

Okra wilt (fusariose), Fusarium vasinfectum, and clover rhizoctoniose, F. L. STEVENS and G. W. WILSON (*North Carolina Sta. Rpt. 1911, pp. 70–73, figs. 4*).—A description is given of the okra wilt caused by *F. vasinfectum*, a disease which apparently has not been hitherto recorded in North Carolina. In general the disease agrees closely with the wilt of cotton. The fungus when isolated grows readily in cultures, producing the characteristics which agree with those of *F. vasinfectum* on cotton.

During the season covered by the report complaints were received from a number of localities regarding a disease of clover. An examination of the roots showed that they were infested by *Rhizoctonia* sp., which was clearly the cause of the trouble.

The present status of the question of rust propagation, J. BEAUVERIE (*Rev. Gén. Sci., 23 (1912), No. 3, pp. 106–118*).—A critical review is given of literature relating to the general subject of rust propagation, specialization, etc., the summary being brought down to 1911. Special attention is given to Eriksson's mycoplasm theory and Zach's criticism of it (E. S. R., 25, p. 652).

Perennial gametophytic and sporophytic generations in Puccinia obtegens, E. W. OLIVE (*Abs. in Science, n. ser., 35 (1912), No. 891, p. 150*).—A description is given of a form of this rust, better known under the name of *P. suaveolens*, which was found at Brookings, S. Dak., on an European variety of the Canada thistle. As commonly described, this fungus is said to possess 2 distinct generations, one resulting from a general infection throughout the whole plant, and the second a strictly local infection, in which only uredospores and teleutospores are produced.

Preliminary investigations by the author of the so-called first generation showed that both uninucleated gametophytic and binucleated sporophytic mycelia ramified together throughout the infected plants. The general infection of the Canada thistle is held, therefore, to be due to the growth of 2 generations by a mixture of the mycelia, and evidence appears to show that both forms winter over together in the underground parts of the plant.

Infection experiments with parasitic fungi, O. TREBOUX (*Ann. Mycol., 10 (1912), No. 1, pp. 73–76*).—A brief summary is given of infection experiments with 10 species of Uredineæ to determine the host plants of their alternate generations.

Myxofusicoccum, a new genus of Sphæropsidearum, H. DIEDICKE (*Ann. Mycol., 10 (1912), No. 1, pp. 68–72, fig. 1*).—The author proposes the name Myxofusicoccum for a number of parasitic fungi that have been referred to the genera Phoma, Fusicoccum, and Myxosporium. In all 16 species are referred to this new genus.

Oïdium tuckeri and Uncinula americana in Poland, J. BRZEZINSKI (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. B, 1911, No. 1, pp. 1–6*).—A 3-years' study of *O. tuckeri* and *U. americana* (*necator?*), which is here as elsewhere (E. S. R., 23, p. 151) claimed to be the perithecial form of *O. tuckeri*, leads the author to conclude that not only has this mildew become acclimated in Poland but that in that climate it now passes through the entire cycle of its normal development.

Neutralizing nematode injury, KRÜGER (*Ztschr. Ver. Deut. Zuckerindus., 1911, No. 667, II, pp. 802–811*).—After a discussion of nematode injuries and of means of opposing such attacks, the author gives a preliminary account of his own investigations carried on in open fields as a practical test of theoretical conclusions regarding the relations of nutrition to injury by parasites. The experiments, though not yet complete, have progressed for 3 years, alternating sugar beets with barley on heavily infected plats of ground, part of this time under conditions unfavorable to normal crops.

Fertilizers containing compounds of nitrogen, potassium, and phosphorus were carefully adapted to the several soils, and it is claimed that the results obtained thus far justify the view that loss from eelworm injury may be materially decreased by careful adaptation of fertilizers to soils.

A canker of Glycine, L. PAVARINO (*Riv. Patol. Veg., 5 (1911), No. 5, pp. 65–68, pl. 1*).—Roots of Glycine were received in the laboratory showing dark, irregular, depressed areas of considerable size. An examination of the diseased areas showed that the cortex had been destroyed and that the lesions extended well into the vascular portion of the root. The diseased area was found to be infested with bacteria, which were isolated and grown on various culture media. Inoculation experiments left no doubt as to the disease being caused by bacteria.

The organism from its characters appears to be an undescribed one, and the name *Bacterium montemartinii* n. sp. is given it.

Bunt and germination experiments, R. J. HURST (*Agr. Gaz. N. S. Wales, 22 (1911), No. 9, pp. 749–752*).—A number of experiments are described in which wheat was treated with copper sulphate solution, copper sulphate solution and salt, and formalin to test their effect on germination and also on the percentage of diseased plants. The formalin uniformly gave the best results. The copper sulphate solutions destroyed about 25 per cent of the grain.

An experiment to determine whether the smut of barley grass would attack wheat gave negative results, none of the plants inoculated with the grass smut being in any way affected.

Other experiments are reported in which the effect of the different fungicides on the germination of different varieties of wheat was tested, those treated with formalin giving the best results in every case.

In other experiments it was found that the spores of the unbroken stinking smut balls would retain their vitality from one season to the next, but that when crushed and placed in the bottom of a drill, covered and allowed to remain for some weeks, the grain sown with them did not contract the disease, indicating that the spores germinated in the soil but died on account of the lack of a suitable host.

Combating rust of cereals, A. C. TONNELIER (*Min. Agr.* [*Argentina*], *Div. Enseñanza Agr.* [*Pub.*], *4. ser., 1910, No. 1, pp. 13*).—This gives a summary of investigations and opinions concerning rust on grains, with recommendations as to treatment for its prevention.

Rusted grain and the wintering of the rust fungus, J. ERIKSSON (*Centbl. Bakt.* [*etc.*], *2. Abt., 32 (1912), No. 13–19, pp. 453–459*).—This is a discussion dealing with certain grains of wheat affected with rust, as bearing upon the author's theory of a mycoplasm (E. S. R., 26, p. 650), also a bibliography of literature related thereto.

A new smut of grass, D. MCALPINE (*Proc. Linn. Soc. N. S. Wales, 36 (1911), pt. 1, pp. 45, 46, pl. 1*).—A description is given of *Ustilago ewarti*, a new species of smut found on grass, *Sarga stipoidea*. The genus of grass is also said to be a new one.

Downy mildew of alfalfa, C. C. BRITTLEBANK (*Jour. Dept. Agr. Victoria, 10 (1912), No. 1, pp. 65, 66*).—A description is given of a disease of alfalfa due to *Peronospora trifoliorum*. The specimens noticed by the author had a stunted, unthrifty appearance, the upper portions of the stems and leaves being covered by a thick grayish downy layer. Many of the leaves were coated with the fungus on both surfaces, and in some cases the stalks were almost bare of leaves.

Only a few specimens of this disease have thus far been noted, but attention is called to it on account of its possible economic importance.

The control of cotton wilt and root knot, W. A. ORTON and W. W. GILBERT (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 92, pp. 19, figs. 12*).—Attention is called to the wilt and root knot, two serious diseases of the cotton plant particularly on sandy land, and suggestions are given for their control. These diseases have been previously described (E. S. R., 20, p. 450; 26, p. 343).

The method of control consists in the planting of resistant varieties. For the development of supplies of seed, as well as for the possible obtaining of additional varieties, a cooperative breeding plan has been arranged between the Bureau of Plant Industry, the South Carolina Experiment Station, and the Georgia State Board of Entomology, the details of which are explained.

A bacterial disease of onions, A. W. GIAMPIETRO (*Riv. Patol. Veg., 5 (1911), No. 4, pp. 49–52*).—A preliminary account is given of a disease of onions, which is said to be due to *Bacillus coli*. It is thought that this disease is the same as that described by Delacroix, which was attributed to *B. cepivorus* (E. S. R., 18, p. 745).

Bacterial rots of the potato, J. SCHUSTER (*Arb. K. Biol. Anst. Land u. Forstw., 8 (1912), No. 4, pp. 452–492, pl. 1, figs. 13*).—This is an account of a general study of potato rots, of bacteria which cause them, and of means for protection of the plants or tubers against such injury in the field or in storage. The conclusions arrived at may for the most part be summarized as follows:

Potato (soft) rots may be due to (a) obligate parasites which can primarily cause such diseases (as *Bacillus solaniperda*); (b) facultative parasites, which require the cooperation of other factors for their success (as *Bacterium fluores-*

cens at 35° C.); (c) saprophytes, which can flourish and infect only through dead material (as *Bacillus amylobacter*); and (d) faculative parasites, that is, the adapted plant-infecting races of generally harmless saprophytes (as *Bacterium xanthochlorum* n. sp.). These soft rots show various forms, attacking either tubers or stems.

B. xanthochlorum n. sp. is a plant-pathogenic parallel of the harmless saprophyte *B. fluorescens* from which it appears to have developed phylogenetically through the altered conditions due to culture. It is able through wounds to infect potatoes, vetch, and lupines. It secretes a series of enzyms and toxins which kill the protoplasm of the plants attacked. Rot of the tubers follows wound infection only. The bacteria do not enter the plant by way of the lenticels but may invade the leaves through the stomata when the leaves are wet.

B. phytophthorum causes blackleg through infected tubers, as well as the wound infection of the stem, with or without aid from insects.

B. atrosepticum produces a dry rot of tubers, but at ordinary temperatures does not attack the stems. The most resistant tubers are those which form a wound-cork layer within about 24 hours after being injured.

A bibliography is appended.

A bacterial disease of the potato plant in Ireland, G. H. Pethybridge (*Gard. Chron., 3. ser., 50 (1911), No. 1290, pp. 199, 200*).—A description is given of a disease of the potato plant, including the tubers, in Ireland, due to *Bacillus melanogenes*, a preliminary account of which has already been given (E. S. R., 25, p. 454).

On the cause of blindness in potato tubers, Elizabeth Dale (*Ann. Bot. [London], 26 (1912), No. 101, pp. 129–131*).—This disease is so called on account of its completely destroying the eyes of tubers so that they are worthless for seed. The mycelium of the fungus *Verticillium albo-atrum* was found present in the blind potato tubers. It grows up into the new shoots when they are formed, and in some cases may pass into the subaerial shoots. In other cases it never goes beyond the subterranean stems and it creeps along them into the newly formed tubers. If a blind tuber is cut across, the disease may be seen to be confined exclusively to the eyes and to a narrow zone immediately below the cortex. The tubers may be infected by means of vegetative mycelium only, without the formation of any kind of spore. Tubers have been grown for 3 successive years from the original diseased crop, and in each year some have been blind and have had a warty, corky outer surface.

A bacterial disease of potato leaves, Elizabeth Dale (*Ann. Bot. [London], 26 (1912), No. 101, pp. 133–154, pls. 2*).—In the course of investigating the cause of blindness in potatoes (see above) the author found a second disease which proved to be due to bacteria and quite independent of the fungus. In this disease the plants almost invariably show marked symptoms of leaf curl.

In 1910 and 1911 the disease appeared spontaneously in plants grown in pots in a cool greenhouse. A study was made of them showing that the trouble was due to bacteria which are apparently different from those previously described as pathogenic to the potato. The name *Bacillus tubifex* n. sp. is given this organism, which is technically described. The disease seems to be of little practical importance, as a dry, hot summer would render the cuticle of the potato leaves too thick to allow penetration by the organism. The disease so far has been most marked in plants grown in a cool greenhouse.

Experiments with potatoes resistant to wart disease (*Jour. Bd. Agr. [London], 18 (1912), No. 11, pp. 915–919*).—Experiments begun in 1910 to test the power of resisting the wart disease by various varieties of potatoes were reported in 1911, and in 18 centers where wart disease is known to have been recently present, and in most cases the soil badly infected, potatoes were planted

to determine their susceptibility. The varieties tested in 1911 were Aberlady Early, Snowdrop, Southern Queen, Sutton Supreme, Sutton Abundance, Chiswick Favorite, Davie Laird, Sutton White City, Crofter, and Provost.

The season was not a very favorable one for potatoes, but the results obtained on the whole were very satisfactory, and every one of the varieties proved to be disease resistant as a rule.

Potato spraying in 1909 and 1910, N. J. GIDDINGS (*West Virginia Sta. Rpt. San José Scale, etc., 1909–10, pp. 18–22, figs. 6*).—The results are given of experiments carried on at Morgantown in 1909 and at Reedsville in 1910 for the control of potato diseases by spraying with Bordeaux mixture.

The field in 1909 received 3 applications of Bordeaux mixture, and the marketable crop as a result of the spraying was increased by 53.5 per cent. In 1910, 4 applications were given the potato field, with the result that the crop was increased, due to the spraying, 39.3 per cent.

The conclusions drawn by the author from these experiments are that careful potato spraying in West Virginia is profitable, and that the standard method often recommended for the preparation of Bordeaux mixture for use on potatoes is not so important as has usually been supposed.

Spraying potatoes, A. J. PINN (*Agr. Gaz. N. S. Wales, 22 (1911), No. 9, pp. 808–814, fig. 1*).—An account is given of a number of experiments for the control of potato blight by the use of Bordeaux mixture. Different plats were sprayed with strong Bordeaux mixture, from 2 to 5 applications being given during the season, and gains of from 27 to 90 bu. per acre are attributed to the use of the fungicide.

Directions are given for the preparation and application of the mixture, and different forms of spraying apparatus are briefly described.

A review of literature relating to insect and fungus pests of the sugar beet, A. STIFT (*Bl. Zuckerrübenbau, 18 (1911), Nos. 2, pp. 21–24; 5, pp. 81–84; 7, pp. 112–115*).—A summary is given of some of the more important contributions in 1910 to the literature of sugar-beet pests.

Biochemical study of the curly-top disease of sugar beets, H. H. BUNZEL (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 389*).—The results are given of the measurements of the oxidase in diseased and healthy beets, on leaves as well as roots, and under various conditions and stages of development. The results obtained indicate that the diseased leaves have a higher oxidase content than the healthy ones, and this was confirmed in field investigations. The general result of the experiments indicates that the oxidase content is higher in the leaves in all cases where the normal growth of the plant has been interfered with, whether the retardation of growth is brought about by excessive drought, excessive watering of the soil, the curly-top disease, or other diseases.

Observations on the smut disease of sugar cane, S. K. BASU (*Dept. Agr. Bengal. Quart. Jour., 5 (1911), No. 2, pp. 104–107*).—Notes are given on the smut disease of sugar cane caused by *Ustilago sacchari*. This fungus produces large quantities of black spores on the surface of the diseased shoots which are sometimes prolonged into whip-like structures and are readily recognized in the cane fields.

Observations were made on a number of varieties grown in the experimental tract, and while the disease could hardly be called epidemic, yet on one variety, Khari, 80 diseased canes were observed in 38 stools. All the seed cane that was planted had been previously treated with Bordeaux mixture to reduce the possibility of infection. On account of the presence of such a large amount of disease from treated canes the author recommends the uprooting and burning of all infected plants and the exercising of great care in the selection of seed cane.

The root rot of tobacco caused by Thielavia basicola, W. W. GILBERT (*Bol. Tec. Coltiv. Tabacchi* [*Scafati*], *11* (*1912*), *No. 1, pp. 9–54, pls. 5*).—This is a translation of Bulletin 158 of the Bureau of Plant Industry of this Department, previously noted (E. S. R., 22, p. 49).

Tomato leaf rust (*Jour. Bd. Agr.* [*London*], *18* (*1912*), *No. 11, pp. 920, 921, pl. 1*).—The tomato leaf rust (*Cladosporium fulvum*), which has proved very destructive to tomatoes grown under glass in England, is described. Spraying with fungicides has not proved satisfactory unless the applications were made early. When the plants are young it is recommended that they be sprayed with half-strength Bordeaux mixture, to be followed by a solution of potassium sulphid, 1 oz. in 4 gal. of water, when flowers and fruit are present.

European and American Glœosporium fructigenum, O. SCHNEIDER-ORELLI (*Centbl. Bakt.* [*etc.*], *2. Abt., 32* (*1912*), *No. 13–19, pp. 459–467*).—The work here reported on an outgrowth of a previous investigation by the author (E. S. R., 26, p. 749), is a comparative study of the *G. fructigenum* of middle Europe with that found in North America. In this it was found that, while the two are too nearly alike morphologically to class as separate species, the American kind is more active physiologically and as a parasite, attacking twigs as well as fruit in its habitat. A connection is suggested between this activity and the fact that the American fungus inhabits a climate some 5° C. warmer than does that of middle Europe.

Monilia on fruit trees, E. VOGES (*Ztschr. Pflanzenkrank., 22* (*1912*), *No. 2, pp. 86–105, figs. 2*).—The author gives an account of his studies on Monilia in relation to tip burn and die-back in apple and cherry trees, attributed to attacks of *M. cinerea* and *M. fructigena*. While moisture was found to play an important rôle in infection, these fungi readily attacked wounded twigs, flowers, or ripe fruit. Conidia of *M. fructigena* lost their power of germination early in winter. The behavior of *M. fructigena* on apple trees was very similar to that of *M. cinerea* on cherry trees.

Different wintering over of two species of Monilia and its biological significance, R. EWERT (*Ztschr. Pflanzenkrank., 22* (*1912*), *No. 2, pp. 65–86*).—In continuation of the author's investigations on the wintering over of fungi (E. S. R., 23, p. 346), he studied for 2 winters the behavior of *Monilia fructigena* and *M. cinerea* on mummified fruit.

According to the findings here announced, the spores of the former lose their power of germination early in the winter even when colonized on plums, a very favorable situation; while spores of the latter remain all winter capable of infection and awaken early to activity if given warmth and moisture. This difference in these otherwise closely similar fungi is not attributed to a difference in resistance to cold.

A study of diseases of olives, L. PETRI (*Studi sulle malattie dell' olivo. Rome, 1911, pp. 151, pls. 2, figs. 25; noted in Riv. Patol. Veg., 5* (*1911*), *No. 3, pp. 37–39*).—An account is given of the establishment of a laboratory for the study of olive diseases, with a detailed report on a study of the "brusca" of olives.

This disease appears to be a constitutional one that is not affected by soil conditions but seems to be dependent on temperature and moisture as well as factors that tend to destroy the mycorrhiza on the roots and reduce their absorbing power. Such conditions bring about a weakened state of the olive trees and render the leaves subject to fungus attack. In the case of the brusca disease it becomes possible for weakly parasitic fungi to attack the trees, and such fungi as *Stictis panizzei*, *Phyllosticta insulana*, and *Coniothyrium oleæ* readily attack the foliage.

The Cycloconium on the olive, G. De Michele (*Italia Agr., 1911, No. 15, pp. 347–352, figs. 3; abs. in Riv. Patol. Veg., 5 (1911), No. 7, pp. 103, 104*).—On account of reports that spraying olive trees with Bordeaux mixture failed to reduce the leaf fall due to *C. oleaginum*, the author investigated the subject with somewhat contradictory results. Solutions of copper sulphate were found to be not altogether efficient in preventing the defoliation, but this is attributed to the physiological effect on the olive tree and not to the effect on the fungus. It is believed that the presence of lime or potash renders trees less subject to the fungus and that the lack of these elements favors leaf fall.

A solution of copper sulphate is said to have proved very efficient against fumagine of the olive.

The present knowledge in regard to the nature of peach yellows disease, E. W. Morse and L. W. Fetzer (*Abs. in Science, n. ser., 35 (1912), No. 897, p. 393*).—The authors present a summary of the present state of knowledge regarding the disease of peach trees known as yellows, and conclude that it is a constitutional disease which is inheritable. The symptoms of the disease, such as premature ripening of the peach, the appearance of superficial red spots and streaks throughout the flesh, and the yellowing of the leaves, are held to point to the hypothesis that the disease is a metabolic one, due to a disturbance of equilibrium among the enzyms of the plant.

Investigations on the dying of plum trees, E. Rabaté (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), Nos. 33, pp. 197–202; 34, pp. 214–222*).—An investigation was made of the cause of the rapid destruction of plum trees during 1911 in certain portions of France. The conclusion was reached that the trouble was due to the asphyxiation of the roots through a prolonged saturation of the soil, to root rot fungi, or to both causes acting together.

Most of the recent loss is attributed to saturation of the soil, and draining and a better sanitary condition of established orchards and more careful selection for new plantings are recommended.

Double blossom of the dewberry and the blackberry, F. C. Reimer and L. R. Detjen (*North Carolina Sta. Rpt. 1911, pp. 41–50, figs. 5*).—In continuation of a preliminary report on this disease (E. S. R., 25, p. 849), the authors give an account of their investigations which have led to the conclusion that it is due to the fungus *Fusarium rubi*.

This fungus lives in the leaf buds of the young canes, and as the buds develop it spreads and involves the entire rosette. Later, instead of normal shoots growing from the bud, an indefinite number may appear, giving it the appearance of witches' broom.

For the treatment of the disease spraying experiments, although not carried on sufficiently long to give conclusive results, indicate that spraying will not prove a practical remedy. It is suggested that probably the best treatment would be cutting the canes at the surface of the ground as soon as the picking season is over and burning them.

The leaf spot fungi of currants, E. Voges (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 21–24, pp. 573–579, figs. 5*).—The results are given of a study made by the author of a fungus found in the early spring of 1909 on the leaves of currants that had remained green over winter. This fungus he pronounces to be the pycnidia stage of the Mycosphærella, the same species that is found in nature in the leaf spots of gooseberry and raspberry and known on the former as *Phyllosticta grossulariæ* and on the latter as *P. ruborum* and *P. rubicola*.

The unlikeness of the leaf spots is attributed to the differences in the hosts, also possibly to the presence of other parasites associated with this in the affected spots, such presence being both effect and cause of weakness in the leaves affected.

The chlorosis of grapes during the spring G. PROVOST-DUMARCHAIS (*Jour. Agr. Prat., n. scr., 22 (1911), No. 33, pp. 210, 211*).—Attention is called to the disappearance of chlorosis in some of the vineyards of France in the spring of 1911 following a period of hot, dry weather. The author believes that this tends to substantiate his theory that downy mildew and chlorosis are in some way correlated, and that as there was no mildew the chlorotic conditions was outgrown. He thinks it a mistake to consider that chlorosis is due solely to a superabundance of lime in the soil.

How is the grape infected by mildew? H. MÜLLER-THURGAU (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), Nos. 39, pp. 367–371; 42, pp. 454–459*).—The results are given of an investigation on the infection of grapes by the downy mildew (*Plasmopara viticola*). The conclusions, which are essentially the same as given elsewhere (E. S. R., 26, p. 450), indicate that in general infection takes place through the under surfaces of the leaves.

The influence of temperature on the germination of the conidia of downy mildew, L. RAVAZ and G. VERGE (*Prog. Agr. et. Vit. (Ed. l'Est-Centre), 33 (1912), No. 6, pp. 170–177, figs. 3*).—A study was made of the effect of temperature on the germination of the conidia and zoospores of *Plasmopara viticola.*

The development of the zoospores and the conidia was found to take place rapidly at all the temperatures which are favorable to the growth of grapes, especially during rain or mist. Temperatures above 29° C., such as prevail on fine days, were found unfavorable to their development. The germination of the zoospores always took place at the low temperature, as in case of the conidia, and was quite constant.

Roncet, E. PANTANELLI (*Reprint from Vit. Moderna, 17 [1911], No. 10–11, pp. 35; Ztschr. Pflanzenkrank., 22 (1912), No. 1, pp. 1–38, figs. 29*).—This discussion summarizes available data as to this disease, and gives the results of the author's anatomical and physiological investigations therewith.

The fungus diseases of cacao, C. J. J. VAN HALL (*Agron. Trop., 3 (1911), No. 3, I, pp. 33–43*).—Attention is called to the fact that there are many errors in the literature relating to cacao diseases, and to rectify some of them the author, in a paper presented before the International Congress of Tropical Agriculture at Brussels in 1910, briefly describes some of the more important diseases, their causes, and methods for their control. The diseases enumerated are those caused by *Phytophthora* sp., *Fusarium colorans, Diplodina cacaoicola, Corticium javanicum, Colletotrichum luxificum, Stilbella nana, Hymenochæte noxia,* and *Taphrina bussei.*

Diseases of orchids caused by bacteria, G. L. PAVARINO (*Atti R. Accad. Lincei, Rend. Cl., Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), II, No. 5, pp. 233–237*).—Technical descriptions are given of some new species of bacteria causing diseases of cultivated orchids. Among those described are *Bacterium cattleyæ* on *Cattleya* spp., *Bacillus pollacii* on *Odontoglossum citrosmum, Bacterium krameriani* on *Oncidium krameriarum,* and *Bacillus farnetianus* on *Oncidium ornithorincum* and *O. crispa.*

A disease of tulips, A. LENDNER (*Bul. Soc. Bot. Genève, 2. ser., 3 (1911), No. 3, pp. 126–131, figs. 4; Bul. R. Soc. Toscana Ort., 3. ser., 16 (1911), No. 12, pp. 344–349, figs. 4*).—A disease of tulips is described in which the bulbs are attacked by *Botrytis parasitica.* The author believes that a Sclerotium causes part of the trouble, and he states that the differences in size of the sclerotia as well as their structure indicate that *B. parasitica* and what he calls *Sclerotium tuliparum* are not identical.

Previous notes on this disease have been given (E. S. R., 15, p. 488; 16, p. 1095).

The brown leaf spot of colt's foot, F. A. WOLF (*Ann. Mycol., 10 (1912), No. 1, pp. 65–67, fig. 1*).—A study has been made of the leaf spot disease of colt's foot (*Tussilago farfara*), which is caused by *Ramularia brunnea*. This disease is prevalent about Ithaca, N. Y., in the late summer, causing the formation of large characteristic brown spots on the leaves.

A study was made of the fungus, and its different stages were worked out. It was found to be associated with *Sphærella tussilaginis*, and since the asciger-ous and conidial stages of the fungus have not been previously connected, a complete description of it is given.

The development and cytology of Rhodochytrium, R. F. GRIGGS (*Bot. Gaz., 53 (1912), No. 2, pp. 127–173, pls. 6*).—The results are given of a study on *R. spilanthidis*, a parasite of ragweed, reported upon by Atkinson in 1908 (E. S. R., 20, p. 550).

This parasite has been reported in 3 widely separated regions. It has been considered by some as an alga, but it has no chlorophyll and is strictly parasitic in its mode of life, being limited, however, to definite host species. The author states that if it be classed simply on definition, Rhodochytrium would be included among the fungi, but if from a consideration of its relationships, its nearest affinities are with the algæ.

A detailed comparison is made between this parasite and Synchytrium, which it resembles in some respects but to which it is not believed to be closely related.

Tree diseases due to fungi, C. O. FARQUHARSON (*Ann. Scot. Nat. Hist., 1911, No. 80, pp. 240–242*).—Notes are given on a number of tree diseases due to fungus parasites that have been recently observed in the vicinity of Aberdeen, Scotland. These include the yew leaf scorch due to *Sphærulina taxi*, and diseases of Douglas fir attributed to *Sclerotinia fuckeliana*, *Phoma pithya*, and *Scleroderris livida*. The latter fungus appears hitherto to have been reported only as a saprophyte, but it was observed doing considerable damage on trees from 15 to 20 years old. The lower part of the stem for distances of 2 or 3 ft. in some cases was completely covered by a dense brownish mycelium, which disappeared later in the season, and was succeeded by abundant apothecia.

In addition notes are given on the rust of alders due to *Melampsora betulina*, attacks of the black poplar (*Populus nigra*) by *Taphrina aurea*, and of the white pine by *Hypoderma strobicola*.

A disease of pine due to Hypodermella, T. LAGERBERG (*Meddel. Stat. Skogsförsöksanst. (Mitt. Forstl. Vers. Anst. Schwedens), 1910, No. 7, pp. 127–174+XVII–XXII, figs. 14; abs. in Riv. Patol. Veg., 5 (1911), No. 3, p. 35; Ztschr. Pflanzenkrank., 22 (1912), No. 1, pp. 46, 47*).—A description is given of a leaf disease of *Pinus sylvestris* due to *H. sulcigena*. This fungus is said to present pycnidia indistinguishable from those of *Hendersonia acicola*, the cause of a leaf disease in Germany. The author is inclined to believe that the species of Lophodermium should also be referred to this genus.

A new crytogamic disease of pine, M. DOROGUINE (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 1, pp. 105, 106, fig. 1*).—This is a brief account of a disease of *Pinus montana* alleged to be caused by a new species of fungus herein described under the name *Cytosporina septospora* n. sp. The organism attacks the needles parasitically, causing spots of discoloration which cover from one-fourth to one-half of the leaf surface, due to the presence of the fungus in the leaf tissue.

Disease of Pinus strobus due to Lophodermium brachysporum, G. FRON (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 1, pp. 44–46, fig. 1*).—A brief account is given of a leaf-fall disease of the pine claimed to be now first reported in France and ascribed to the fungus named. This is said to produce black spots on the fresh needles of young pine seedlings, causing them to turn

brown and fall, also to attack the branches, causing them to die back, and finally destroying the whole plant. This malady is declared to be totally independent of that said to be caused in the same neighborhood by *Peridermium strobi* though the two may exist simultaneously and be confused in consequence.

Recent observations on some diseases of white pine and yew, G. FRON (*Bul. Trimest. Soc. Mycol. France, 27 (1911), No. 4, pp. 476–481, figs. 2*).—In continuation of work noted above and previously (E. S. R., 20, p. 549) the author considers further the disease due to *Lophodermium brachysporum*, here asserted to be confined rigorously to young plants of *Pinus strobus*. A more detailed description of the parasitic fungus is given, followed by a brief discussion and description of the development of *Glœosporium taxicolum*, said to be saprophytic on yew (*Taxus baccata*), together with notes on the effects of the disease caused by its presence and progress.

A black knot disease of Dianthera americana, I. M. LEWIS (*Mycologia, 4 (1912), No. 2, pp. 66–71, pls. 4*).—A description is given of a disease of the water willow (*D. americana*), in which the aerial portions of the plant exhibit numerous hypertrophied areas in the internodes. The general appearance of the disease is somewhat like that of the black knot due to *Plowrightia morbosa*. It is believed to be due to the fungus *Bagnicsiella diantheræ* n. sp., a technical description of which is given.

A disease of rubber during curing, H. LONAY (*Agron. Trop., 3 (1911), No. 6–7, I, p. 90*).—According to the author, there are frequently noted in the Straits Settlements on Para rubber crape, during its drying, blood-red spots sometimes attaining the size of an inch in diameter. These are due to the chromogenic bacterium *Micrococcus prodigiosus*. They usually appear from the twelfth to the fourteenth day of drying, develop rapidly, but disappear on the complete drying of the rubber. After a period of 6 weeks or more their presence can not be detected, and apparently their occurrence has not in any way injured the quality of the rubber. It is thought that they live on the starch which is contained in the rubber and disappear upon its consumption.

A new wood-penetrating alga, G. T. MOORE (*Abs. in Science, n. scr., 35 (1912), No. 891, p. 153*).—A brief note is given on the penetration of the cells of a yellow-pine board, which had been submerged in the aquarium for several years, by an alga which is believed to be allied with the Cladophoraceæ.

Copper fungicides, S. U. PICKERING (*Jour. Agr. Sci., 4 (1912), No. 3, pp. 273–281*).—Previous investigations reported by the author (E. S. R., 23, p. 50) have led to the conclusion that the efficacy of such substances as fungicides depends on the proportion of copper in them which is rendered soluble by the carbon dioxid of the air, and that if a deficiency of lime is used one of the lower basic sulphates of copper is obtained, from which carbon dioxid liberates a much larger proportion of copper than it does from the more highly basic sulphates present in ordinary Bordeaux mixture. Experiments with the so-called Woburn Bordeaux were believed to show that from 18 to 20 times more copper was rendered soluble than that from ordinary Bordeaux mixture, and it was recommended that the proportion of Woburn Bordeaux should not be reduced below $\frac{1}{12}$ of that of ordinary Bordeaux mixture. Recent experiments have indicated that ordinary Bordeaux mixture is equivalent in its fungicidal action to Woburn Bordeaux containing only about $\frac{1}{6}$ as much copper.

The principal portion of this paper is taken up with a discussion of the theory of Barker and Gimingham on the solution of copper by fungi (E. S. R., 25, p. 458).

The use of copper oxychlorid as a fungicide, E. CHUARD (*Jour. Agr. Prat., n. scr., 22 (1911), No. 38, pp. 374, 375*).—The question of the possible injurious effect of copper adhering to grapes that had been sprayed with copper oxychlorid

having been raised, the author states that as this compound contains about 4 times as much copper as is present in copper sulphate, less of it can and should be used. Any copper present on the grapes, he says, would be precipitated in the wine as an insoluble sulphid through the sulphuretted hydrogen liberated during the fermentation. In a similar manner he claims that barium chlorid may be substituted for arsenic compounds used as insecticides, the barium being rapidly precipitated in an insoluble form during the fermentation of grapes in the process of wine making.

Testing powders of sulphur and sulphur-copper sulphate mixture for use in vineyards, J. SLAUS-KANTSCHIEDER (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 12, pp. 1378–1383*).—Detailed directions are given for the employment of the Chancel method for determining the fineness and consequent value of the powders to be used and the percentage of copper sulphate in the mixture. The mixture should be employed when Peronospora is present on the vines in addition of Oïdium, but the powdery mildew when alone is best combated by the application of sulphur reduced to an impalpable powder.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Annual report of the Governor of Alaska on the Alaska game law, 1911, W. E. CLARK (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 85, p. 12*).—This report deals with the game supply, violations of the law, nonresident hunters, wardens, licensed guides, needed amendments of the law, hunting and shipping licenses, receipts, and game or trophies shipped from Alaska during 1911. A summary of the provisions of the game law and regulations is appended.

West Virginia forest, game, and fish laws, and the Lacey bird law (federal law), 1911 (*Charleston, W. Va. [1912], p. 59*).—A handy pocket guide.

A note on a peculiarity of plague on the Hamakua Coast of Hawaii, G. W. MCCOY (*Pub. Health and Mar.-Hosp. Serv. U. S., Pub. Health Rpts., 27 (1912), No. 14, pp. 489, 490*).—It is stated that at present this disease occurs rather extensively among rats on the north coast of the island of Hawaii, known locally as the Hamakua Coast. "It seems clear that, regardless of the direct mode of infection, rats are the primary source of the human cases, as large numbers of plague-infected rats are being taken on the Hamakua Coast."

New state quarantine law (*Mo. Bul. Com. Hort. Cal., 1 (1912), No. 2, pp. 42–44*).—The text of the quarantine law of January 2, 1911, is presented. This act prohibits the introduction of insects, diseases, or animals, injurious to fruit or fruit trees, vines, bushes, or vegetables, and provides for a quarantine for its enforcement.

A history of the birds of Colorado, W. L. SCLATER (*London, 1912, pp. XXIV+576, pls. 18*).—This volume is said to be founded upon the very complete collection of Colorado birds formed during the last 35 years by C. E. Aiken, of Colorado Springs, and which was recently presented to the museum of Colorado College. The author gives keys to the orders, families, genera, and species of birds that occur in the State. In additon to references to literature, descriptions, and distribution, the habits of many of the species are considered at considerable length.

The number of Colorado birds included in the work is 392, of which 225 may be considered regular breeders within the State. Sixty-seven are resident throughout the year, 118 are strict migrants which, so far as known, never winter within the limits of the State, and 40 are birds which breed within the State but in winter are undoubtedly less numerous, so that they may be considered partly migrant and partly resident. Of the 167 nonbreeding birds, 106

are casual or rare species, which have only been recorded on very few occasions, 28 are winter residents, and 33 are birds which pass through the State on the spring and fall migration.

A bibliography of 19 pages is included, together with a list of the various localities mentioned in the work and a complete index.

The finches and weaver birds of the Sudan, being notes on the group containing the birds injurious to grain crops, A. L. BUTLER (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 4 (1911), B. Gen. Sci., pp. 157–177, pls. 2*).—It is stated that this paper includes all the finches known to occur in the Anglo-Egyptian Sudan, although it is thought that only a small proportion of them will be found to be appreciably destructive to agriculture. So far as known the damage is done entirely by sparrows and the extremely abundant weaver birds of the genera Hyphantornis, Xanthophilus, Quelea, and, in a smaller degree, Pyromelana.

The starling (Sturnus vulgaris) at Springfield, Mass., R. O. MORRIS (*Auk. 29 (1912), No. 2, p. 243*).—Since 1908, when the presence of a single starling was observed in the vicinity of Springfield, the species has rapidly increased until in the winter of 1912 flocks of 100 individuals were frequently seen, occasionally coming into the very center of the city, and frequenting the spires and cupolas of the churches and public buildings.

The composition of taxonomic papers, R. A. MUTTKOWSKI (*Ann. Ent. Soc. Amer., 4 (1911), No. 2, pp. 194–217*).—The author discusses standards for descriptions, colors, nomenclature, keys, indexes, titles, and reprints.

A bibliography of the principal writings of Daniel William Coquillett (*Proc. Ent. Soc. Wash., 13 (1911), No. 4, pp. 199–210*).—This bibliography, which is arranged in chronological order, includes publications issued from 1876 to 1911.

Eleventh report of the state entomologist of Connecticut for the year 1911, W. E. BRITTON (*Connecticut Sta. Rpt. 1911, pt. 4, pp. IV+259–346, pls. 16, figs. 10*).—A brief financial statement and report of the chief lines of work, entomological features of 1911, and inspection of nurseries, including a list of nursery firms in Connecticut receiving certificates in 1911, is first presented. This is followed by an account of Inspection of Imported Nursery Stock (pp. 271–275), by W. E. Britton and B. H. Walden, of the inspection of apiaries in 1911 (pp. 275–277), of Progress in Controlling the Gipsy Moth in Connecticut in 1911 (pp. 277–280) and Checking the Spread of the Brown-Tail Moth in Connecticut in 1911 (pp. 281–286), the last two by W. E. Britton and D. J. Caffrey.

During the year but 3 gipsy-moth egg masses were discovered at Stonington, and but 23 egg masses, 1,551 caterpillars, 15 cocoons, and 2 adults, at Wallingford. The result of the work with the brown-tail moth shows that this pest, in the course of its natural spread from the adjoining infested area in Massachusetts and Rhode Island, has established itself in the towns of Thompson, Woodstock, Putnam, Pomfret, and part of Killingly in Connecticut.

An account of the onion maggot (*Phorbia ceparum*), including the character of its damage, life history, description, natural enemies, control methods, preventives, remedies, and literature, is presented by D. J. Caffrey (pp. 286–292). Under the heading The Pyralid (*Omphalocera dentosa*), a Pest of Barberry Hedges, the author describes the feeding habits of this moth. The caterpillars were found feeding not only upon the common barberry, *Berberis vulgaris* and its purple-leaved form, but also on the Japanese barberry, *B. thunbergii*, which is used rather extensively for hedges, and on other species of barberry.

By a postal card canvass it was determined that Brood II of the periodical cicada, or 17-year locusts, appeared in 1911 in the same localities as in previous cicada years, being present in Hartford, New Haven, and Middlesex counties.

The maple-leaf stem-borer (*Priophorus accricaulis*) was again found in 1911. "Apparently it was more abundant in 1911 than it has been since 1906. . . . The petioles or stems of the leaves are tunneled by the larvæ, and break off at a point half to quarter of an inch from the blades. The blades fall late in May and early in June, often covering the ground, while the stems or petioles remain upon the tree until 10 days or 2 weeks later, when they are shed and drop to the ground."

A brief account of preliminary tests to prevent damage by the white pine weevil (*Pissodes strobi*) is presented by W. E. Britton and B. H. Walden (pp. 307–309). This is the most serious insect pest of young white pines in Connecticut; while it has been present in the State for a great many years, its injury has greatly increased during the past few years owing to the fact that white pine is being extensively planted as a forest tree. Although the experiments conducted were not extensive enough to form any definite conclusions, they indicate that considerable injury from the weevil can be prevented by spraying leaders with lead arsenate at the proper time.

A brief account is given of the cherry tent-maker or cherry tortrix (*Archips cerasivorana*) which, as it attacks chiefly the choke cherry, can scarcely be considered an injurious insect. This is thought to account for the small number of references to it.

The poplar mocha-stone moth or tent-maker, *Melalopha* (*Ichthyura*) *inclusa*, continued to be abundant in 1911. The caterpillars feed gregariously upon the different kinds of poplars and willows, and make small webs which remain on the twigs and resemble the winter nests of the brown-tail moth.

Accounts of The Colorado Potato Beetle (pp. 311–313) and of The Peach Sawfly (*Pamphilius persicum*) in Connecticut in 1911 (pp. 314, 315), are given by B. H. Walden. An account of The Leopard Moth, here presented (pp. 317–338), has been previously noted as Bulletin 169 (E. S. R., 26, p. 556).

Brief notes are also given on the migration of the cotton moth (*Alabama argillacea*) into Connecticut, of a tachinid parasite (*Latreillimyia bifasciata*) of the imperial moth (*Basilona imperialis*), a borer (*Dioryctria abietella*) in spruce twigs, the prevalence of the hickory bark borer (*Scolytus quadrispinosus*), the apple-leaf crumpler (*Mineola indiginella*), the chrysanthemum leaf-miner (*Phytomyza chrysanthemi*), the occurrence of tent caterpillars, woolly pine aphids (*Chermes pinicorticis* and *C. pinifoliæ*), the woolly apple aphis, the elm scale, the woolly maple leaf scale (*Phenacoccus accricola*), the locust borer (*Cyllene robiniæ*), and on ortho-arsenite of zinc.

Report of entomologist, R. I. Smith (*North Carolina Sta. Rpt. 1911, pp. 34–37*).—This is a brief report of the work of the year with notes on the occurrence of insect pests, including the spring grain aphis (*Toxoptera graminum*), which was unusually numerous and injurious to oats and wheat at West Raleigh; corn flea beetles (*Chætocnema parcepunctata* and *C. pulicaria*), which were very abundant and destructive to young corn during May and June; and red spiders (*Tetranychus gloveri*), which appeared in remarkable numbers in gardens in the vicinity of the station, many reports of their presence on cotton also being received.

Entomological investigations (*Philippine Agr. Rev. [English Ed.]. 5 (1912), No. 1, pp. 37–40*).—This report covers the year ended June 30, 1911.

It is stated that considerable damage is caused in tobacco factories of Manila by a cigarette beetle, in the field by the tobacco aphis, stem borer, cutworms, budworms, etc., and in warehouses by the tobacco moth. In some of the mango

districts insect pests reduce the crop more than one-half, the principal pests being the so-called leaf hopper (*Idiocerus* sp.), which attacks the flower panicles, sucking the sap from the pedicels and thus weakening the minute fruits so that they drop off, and a fruit fly which does considerable damage to immature fruits in Luzon. In November a twig borer was noted on mango trees at Santa Mesa, and the same or a similar pest has been observed near San Francisco, Cavite.

Two maize pests have been observed, one attacking the stem by boring into it, and another, probably the tobacco leaf caterpillar, attacking the developed ears. A small moth has been found defoliating citrus trees at Cagayan, Misamis, and larvæ of a species of Papilio were noted attacking lemon trees at Daraga, Albay. A bagworm has been found to attack bananas in several localities. Studies of the banana leaf roller have shown that it is parasitized by *Chalcis thracis* and 2 other hymenopterons and a dipteron.

A root beetle (*Holotrichia vidua*) is the most serious cane pest in the islands, in some areas temporarily necessitating abandonment of the field. A red weevil (Sphenophorus) has been noticed in Negros canes. A woolly aphid (*Oregma lanigera*) is troublesome in some areas, and a fulgorid (*Phenice mocsta*) has been noted on cane in Occidental Negros. The cabbage butterfly (*Pieris* sp.) is said to have been more or less troublesome on cruciferous crops.

During the year locusts were reported from something over 100 municipalities and barrios. Serious losses were suffered from rats in cane and coconut districts. It appears that at least 3 and probably 5 species of rats are concerned with cane and coconut damage.

Notes on two important parasites of economic insects, A. B. GAHAN (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 423–425*).—The author presents biological notes upon *Telenomus quaintancei*, an egg parasite of the peach tree borer, which was reared from eggs collected at College Park, Md., and *Aphidius nigripes*, which parasitizes the European grain louse (*Macrosiphum granaria*).

The enemies of peas, P. NOEL (*Bul. Lab. Régional Ent. Agr. [Rouen], 1911, No. 4, pp. 12–14; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 11–12, p. 2626*).—The author lists 26 insect enemies.

Cranberry insects, H. J. FRANKLIN (*Ann. Rpt. Cape Cod Cranberry Growers' Assoc., 24 (1911), pp. 20–25*).—The work of the year with insect pests was largely devoted to the fruit worm (*Mineola vaccinii*) and black-headed cranberry worm or fireworm (*Eudemis vacciniana*).

Spraying for the fireworm as previously recommended (E. S. R., 21, p. 156) is said to have been nearly universally successful. The density of the vines has been found to be an important factor, not hitherto recognized, in dealing with the fireworm. Thick vines shade the eggs laid on the lower leaves with the result that the hatching period is often so much prolonged that there is no period during the year when the eggs of either the first or second brood are not present in considerable numbers.

It is stated that if a bog is winter flowed and not reflowed at all in the spring and not sprayed with arsenical poisons, thin vines are as likely to become infested with the fireworm as are thick ones. If the bog is regularly reflowed only once after about May 25, it is apparently much more likely to become infested if it has thick vines. "It is evidently a very difficult matter to free a heavily vined bog from this insect or even to keep it from doing very serious injury year after year, either with water or with poison. On the other hand, as far as my observation goes, this insect can easily be controlled and kept from doing any considerable injury on a thinly vined bog either by spraying with arsenate of lead or by reflowing once. This insect only rarely gets into

a bog to any extent, when it is reflowed with quick reflowage (i. e., quickly put on) 2 or 3 times regularly after May 25, and if it does get in it never stays long, whatever the condition of the vines."

In further work with the fruit worm, it was found that 4 lbs. of resin fish oil soap to 50 gal. of water used in conjunction with Bordeaux mixture and Paris green causes trouble by clogging the valves of the spray pump. Thus it is recommended that the amount be reduced to 2 lbs. to 50 gal. of water, the formula to consist of stone lime 5 lbs., copper sulphate 2½ lbs., resin fish oil soap 2 lbs., Paris green 1 lb., and water 50 gal.

Work with parasites of the fruit worm was commenced during the year.

Heavy fall and spring sanding for the girdler (*Crambus hortuellus*), where reflowing could not be done after picking, has in some cases proved successful, while in others it failed to give satisfaction, the failure in every case observed being due to the fact that the sand was not applied evenly over the infested bog. Two new cranberry insect pests, one a scale somewhat similar in appearance to the San José, the other the larva of a June beetle, were found to cause considerable injury in some places on cranberry bogs.

Quite extensive observations and experiments were made on the fertilization of the blossoms of the cranberry with a view to discovering the important agents in cross pollination and the determination of the value of the honeybee. In conducting this study 3 tents of mosquito netting were erected on the bog. The season's experience is said to confirm the conclusions of the previous year, namely, that it will often pay to keep hive bees near cranberry bogs during the blooming season.

Insects injurious to citrus fruits and methods for combating them, W. V. Tower (*Porto Rico Sta. Bul. 10, Spanish Ed., pp. 36, pls. 5*).—This is a Spanish edition of the bulletin previously noted (E. S. R., 25, p. 253).

California redwood attacked by Termes lucifugus, W. B. Parker (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 422, 423*).—The work of these insects upon the string pegs and trellis poles in the hop yards near Sacramento shows that under some circumstances, at least, this wood is subject to attack by *T. lucifugus*.

A true internal parasite of Thysanoptera, H. M. Russell (*Proc. Ent. Soc. Wash., 13 (1911), No. 4, pp. 235–238*).—The author records the rearing of the parasite *Thripoctenus russelli* from *Heliothrips fasciatus*, *Thrips tabaci*, and *Euthrips tritici* in Los Angeles County, Cal.

"This parasitism first becomes evident 2 or 3 days after the thrips larvæ have changed to the prepupal stage and often after the normal insects have further changed to the pupal stage. . . . The parasitic larvæ emerge and pupate within from 2 to 11 days after the parasitism becomes evident, but, in over 66 per cent of the cases observed, in from 3 to 4 days. . . . During the summer the pupal stage varied in length from 16 to 28 days, but over 66 per cent of the specimens reared completed this stage in from 17 to 20 days. . . . Field collections this past summer (1911) have shown it to be breeding extensively in the onion thrips and bean thrips (*Heliothrips fasciatus*), the parasitism in some cases running as high as 70 per cent. The greatest number of adults reared from the eggs deposited by a single female so far has been 91 specimens.

"The time from the laying of the egg until the parasitism is indicated in the host prepupa varies from 6 to 15 days, but is 7 days in the greater number of cases. The time required from oviposition to the pupation of the parasite varies from 8 days in the case of a very few, to 24 days in a few cases, but over 56 per cent change in from 10 to 14 days. The whole life cycle, then, requires from 28 to 48 days, with a mean average temperature of about 65° F. The winter is undoubtedly passed in the pupa stage, but the writer hopes to settle this point definitely during the coming winter. At present this parasite is known to occur

at Compton, Whittier, Puente, and Hollywood, all situated in Los Angeles County, Cal., and making up an area of nearly 150 square miles."

In regard to its abundance the author states that between 40 and 50 adults were counted on a single plant of *Nicotiana glauca* infested by the bean thrips and that it is now almost impossible to collect *H. fasciatus* at Compton, where this parasite was first discovered.

A new insect pest (Trioza alacris), D. L. CRAWFORD (*Mo. Bul. Com. Hort. Cal., 1 (1912), No. 3, pp. 86, 87*).—*T. alacris*, a gall-making psyllid, which for more than 25 years has been known to attack and seriously disfigure the leaves of certain ornamental shade trees all over Europe, is reported to have made its appearance in California, having been brought into the State on nursery stock. Specimens in all stages, together with the disfigured leaves, were found by O. E. Bremner, state quarantine deputy, on the ornamental laurel (*Laurus nobilis*) in the nursery yards at Oakland. The infested trees are said to have been imported from Belgium several years ago. The pest has also been found in San Mateo County on laurels.

Two new aphids from California, W. M. DAVIDSON (*Jour. Econ. Ent., 4 (1911), No. 6, pp. 559–562, figs. 9*).—*Hyadaphis umbellulariæ*, taken from the leaves of California laurel (*Umbellularia californica*), and *Cryptosiphum tahoense*, which occurs in galls on leaves and flower or fruit stalks of at least 2 species of manzanita (*Arctostaphylos pumilla* and *A. tomentosa*) are described as new to science.

The white fly (Aleyrodes citri) in California, G. E. MERRILL (*Mo. Bul. Com. Hort. Cal., 1 (1911), No. 1, pp. 14, 15*).—A brief account of the occurrence of this pest in California and the measures taken to eradicate it.

The white-fly work at Marysville, G. E. MERRILL (*Mo. Bul. Com. Hort. Cal., 1 (1912), No. 2, pp. 62, 63*).—This is a brief account of an attempt to defoliate infested citrus trees and other host plants by spraying with a mixture of 5 per cent distillate in water with 6 lbs. of caustic soda added to each 100 gal. The desired defoliating effect was not manifest at the time of writing, due apparently to the dormant condition of the trees, but the larger part of the white-fly larvæ present was thought to have been destroyed through the action of the spray, thus materially diminishing the possibility of spread of the insect.

A new pest of saltbush: White fly (Aleyrodes atriplex n. sp.), W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 22 (1911), No. 9, pp. 757, 758, figs. 6*).—A new species of white fly found feeding upon saltbush, a valuable fodder plant, at Broken Hill, where it covered the whole of the underside of nearly every leaf, is described as *A. atriplex*. A tiny, yellow chalcidid, which was reared in considerable numbers from this white fly, is thought to be a large factor in its control under ordinary conditions.

The Coccidæ of Louisiana, T. C. BARBER (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 448–451*).—In this second paper the author lists 65 species, including the 34 previously noted (E. S. R., 24, p. 456).

A structural study of some caterpillars, W. T. M. FORBES (*Ann. Ent. Soc. Amer., 3 (1910), No. 2, pp. 94–143, figs. 143*).—This paper presents studies made of the external structure, particularly of the parts and setæ of the head of caterpillars. Attention is called to the fact that comparatively little attention has as yet been given to the minute description of caterpillars. The author finds that the characters of the head can be made out quite as easily from cast skins as from killed material. The body can not be studied quite so well, but at least the arrangement of the proleg hooks, and also the type of vestiture, whether primary, secondary, or tufted, can be made out without trouble.

An artificial key to the families of Frenatæ and a classified bibliography are included.

A structural study of the caterpillars.—II, The Sphingidæ, W. T. M. FORBES (*Ann. Ent. Soc. Amer., 4 (1911), No. 3, pp. 261–281, figs. 16*).—This paper is in continuation of that noted above. A table for the separation of the genera and subgenera of Sphingidæ is included, together with a field key to the sphingid caterpillars of the eastern United States.

Spraying for the codling moth in 1910, W. E. RUMSEY (*West Virginia Sta. Rpt. San José Scale, etc., 1909–10, pp. 29–37, figs. 5*).—The spraying experiments conducted in 1909 and previously noted (E. S. R., 23, p. 259) were repeated.

For the purpose of testing the relative merits of 4 mist sprays and 1 coarse high-pressure spray against the codling moth Ben Davis trees were used in 1910. The details, which are presented largely in tabular form, have led to the following conclusions:

"The 2 years' work on spraying for the codling moth in West Virginia seems to indicate that the coarse-high-pressure spray is the proper one to use just after the petals fall and then use a good mist spray about the middle of July to catch the second brood of larvæ (worms) that are attacking the fruit at this time. It appears that enough side wormy apples would be prevented by this second spray to justify the cost of material and time required to apply it. Two sprayings, therefore, are enough to prevent losses from the ravages of the codling moth, but where diseases are prevalent more fungicidal sprays are undoubtedly necessary."

Spraying experiments with the plum curculio in 1910 presented in tabular form, "indicate that the proper time to spray apple trees to prevent injury by the plum curculio is at the same time the first application is made for the codling moth."

Observations on the biology of the eudemis, P. MARCHAL (*Rev. Vit., 36 (1911), Nos. 940, pp. 690–695; 941, pp. 721–724*).—In this paper the author considers the succession of generations during the year, the feeding habits of the moth, oviposition, number of eggs deposited, incubation period of the egg, the effect of insecticides upon the eggs, the hatching of the egg, the first migration and first attack, action of nicotin on the larvæ at the time of emergence, etc.

Hosts and galls of American gall midges, E. P. FELT (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 451–475*).—This list summarizes our knowledge concerning the food habits of the American gall midges or Itonidæ, including certain St. Vincent and other South American forms studied by the author.

New species of gall midges, E. P. FELT (*Jour. Econ. Ent., 4 (1911), Nos. 5, pp. 476–484, fig. 1; 6, pp. 546–559*).—One genus (Kronomyia) and 41 species are described as new to science.

Sewage works and street gullies as breeding grounds of mosquitoes, E. H. T. NASH (*Surveyor, 41 (1912), No. 1052, pp. 434–436, figs. 5*).—A report by the medical officer of health of work against *Culex pipiens* at Wimbledon, England.

A danger to our citrus belt, D. L. CRAWFORD (*Mo. Bul. Com. Hort. Cal., 1 (1912), No. 2, pp. 46–49, figs. 2*).—This paper consists of some of the more important facts relating to the Mexican orange maggot (*Anastrepha* [*Trypeta*] *ludens*) given in a paper previously noted (E. S. R., 25, p. 56).

Review of work by Pantel and Portchinski on reproductive and early stage characters of muscoid flies, C. H. T. TOWNSEND (*Proc. Ent. Soc. Wash., 13 (1911), No. 3, pp. 151–170*).—Largely a review of work previously noted (E. S. R., 23, p. 562).

Announcement of further results secured in the study of muscoid flies, C. H. T. TOWNSEND (*Ann. Ent. Soc. Amer., 4 (1911), No. 2, pp. 127–152*).—This is an announcement of studies of the female reproductive system, eggs, and first-stage maggots of the tachinid flies and their allies, conducted in continuation of investigations previously noted (E. S. R., 20, p. 456).

The house fly (Musca domestica), R. I. Smith (*North Carolina Sta. Rpt. 1911, pp. 62–69, figs. 2*).—This paper deals with the breeding habits of house flies and reports experiments in which formalin in milk was used as a fly poison, a brief account of which has been previously noted (E. S. R., 25, p. 662).

To determine the feasibility of preventing the maggots from developing in cow manure and at the same time adding to its fertilizer value, tests were made of 16 per cent acid phosphate by mixing lots of 200 lbs. and 400 lbs. with about 2,000 lbs. of manure. Entirely negative results were secured from the standpoint of killing the maggots, as they were present by the thousands in all piles when the experiment was discontinued and the maggots had commenced to mature. The manure treated with acid phosphate contained as many maggots as the untreated pile. Similar results were obtained on substituting 400 lbs. of floats.

The application of a 4 per cent water solution of formalin to a pile of manure gave negative results. "The liberal use of disinfectants, such as creolin, zenoleum, etc., applied 3 or 4 times a week to the walls and floor of box stalls serves to keep flies out to some extent, but the writer's observations lead him to believe that such applications are of comparatively little value as usually used. . . . All the work conducted shows that the weekly removal of all stable manure, and that accumulating in the yards or piled outside, is the only way to really prevent flies from breeding around the barns."

Formalin was tested in various proportions, using 1 oz. to from 10 to 20 oz. of whole milk or diluted milk. It was found that all proportions were quite effective, but in some cases the strongest mixture seemed to repel the flies, while the weakest did not kill them quickly, and probably a few at least revived, after being partly disabled by the formalin. The mixture which the author recommends consists of 1 oz. of 40 per cent formalin and 16 oz. of equal parts milk and water.

The work of poisoning flies in a calf barn and pig pen is briefly reported. It is stated that in one experiment, which was started about 4 p. m., about 1,000 flies were dead or partly overcome by formalin within 30 minutes. Little pigs at once commenced to eat the dead flies and consumed large numbers without showing any ill effects. Dead flies killed by the formalin mixture were also fed to chickens without any injury.

The life history of weevils, G. Fuchs (*Naturw. Ztschr. Forst u. Landw., 10 (1912), No. 1, pp. 43–54*).—This paper consists of 2 parts, the first dealing with the life history and bionomics of *Otiorhynchus sensitivus* (*planatus*), and the second with the bionomics of *Hylobius abietis*. The author has occasionally found the larvæ of *O. sensitivus* to be parasitized by *Megastigmus aculeatus*. *Bracon brachycerus* is said to be an important enemy of *H. abietis*.

Notes on the host plants and parasites of some North American Bruchidæ, R. A. Cushman (*Jour. Econ. Ent., 4 (1911), No. 6, pp. 489–510*).—In this paper the author has brought together the information relating to the host plants of the various species of Bruchidæ and their parasites, gained during the course of investigations of the cotton boll weevil. "This group of beetles, at least in breeding habits, approaching closely many of the weevils, attracts many of the parasitic enemies of that group. A number of the most important of the parasites of the boll weevil have been found to attack bruchids, and for this reason many lots of infested material were collected and placed in breeding cages and the issuing parasites recorded. All but 2 of the bruchid species discussed here breed in the pods of leguminous plants."

"At least 8 of the species of parasites reared from bruchids are known to attack the boll weevil. Of these *Cerambycobius cyanicceps* is, on account of its wide geographical and host range, by far the most important. It has been

definitely reared from at least 7 species of bruchids ranging from New Mexico to the District of Columbia, and from many other hosts in stems, fruits, and buds, as well as from the boll weevil throughout the range of that species in the United States."

Studies in the biology of the boll weevil in the Mississippi Delta region of Louisiana, R. A. CUSHMAN (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 432-448, fig. 1*).—This article is based upon studies conducted by the author at Tallulah, La. Under oviposition the author considers the periodic division of daily oviposition, and the total, daily, and maximum oviposition and oviposition period, and under life cycle the preoviposition period, developmental period, and comparative duration of developmental period in males and females.

Preliminary report of investigations with the corn billbug, R. I. SMITH (*North Carolina Sta. Rpt. 1911, pp. 51–61, figs. 7*).—This is a preliminary report of an investigation made of *Sphenophorus callosus*. The investigation was brought about by the unusual amount of damage caused by this beetle in the spring of 1910 in Camden and other coastal counties.

At Braswell the author found cornfields on June 20, 1910, in which the third planting of corn was being destroyed. Billbugs were also collected on the same trip at Chadbourn, principally in rice fields, and at Lumberton, Proctorville, and Elrod, in Robeson County. At all these places the beetles were found ovipositing and breeding in the corn plats, although it is said that practically all previous reports state that the billbugs breed entirely in rice and sedge grasses.

Seventeen beetles collected June 20 were kept on green corn stalks, in which they continued to oviposit until after September 3, and during the winter in a large glass jar half full of earth, in which they remained buried from 1 to 3 or 4 in., except on warm days when 2 or 3 were sometimes seen moving about on the surface. Sixteen were found alive on February 14, 1911, but on March 1 all were dead.

"On July 28, 1910, billbug eggs and larvæ were discovered in the stems and roots of elegant nutgrass (*Cyperus flavicomus*) in bottom land at West Raleigh. A few eggs, but no larvæ, were found in some young corn plants. During August and September many Sphenophorus larvæ, pupæ, and adults were collected from *C. flavicomus* growing in cornfields about West Raleigh."

The food plants thus far discovered are *C. flavicomus, C. strigosus, C. cylindricus, C. overlaris*, and *C. esculentus*, as well as rice and corn. It is thought probable that many other Cyperus and closely related grasses will be found to serve as food plants.

A search for the appearance of beetles in spring resulted in the finding of *S. venatus* on a young corn plant in an upland field on May 2. On May 9, a cornfield was found at St. Pauls, in Robeson County, in which the corn had been replanted. The first planting, according to the owner, had been killed by the billbug, and about 75 per cent of the second planting was also damaged. A search resulted in the discovery of 15 beetles in the course of 1½ hours, but no sign of eggs. These beetles were taken to the laboratory, fed on young corn plants, and observed daily for signs of mating and egg laying, but this was not noticed until after May 22, at which time another lot of beetles commenced to oviposit.

While *S. callosus* is the species that causes all the damage reported from the eastern counties, so far as the author knows it has never been recorded as feeding on corn in the vicinity of Raleigh. "The observations made this spring seem to indicate that, while the species is quite numerous here, and breeds freely in yellow nutgrass (*C. esculentus*) in the early summer and, later, in elegant

nutgrass (*C. flavicomus*) also, it does not naturally cause much damage to the young corn."

Sphenophorus parvulus is not common at Raleigh, but a single female collected May 19, 1911, has laid 63 eggs, commencing with 3 eggs on May 22. "On June 30, 3 eggs were laid and the beetle showed no sign of stopping. The newly hatched larvæ are very small and require very careful handling. The first larva was secured June 8, and since then several have hatched and are now feeding and growing satisfactorily."

The mite *Tyroglyphus americanus* appeared in the experimental cage.

A classification of the suborder Chalastogastra of the Hymenoptera, S. A. ROHWER (*Proc. Ent. Soc. Wash., 13 (1911), No. 4, pp. 215–226*).—This paper consists of tables for the separation and characterization of the superfamilies Megalodontoidea, Oryssoidea, Sirecoidea, and Tenthredinoidea, their families, subfamilies, and tribes.

Notes on the pear slug (Eriocampoides limacina), R. L. WEBSTER (*Ann. Ent. Soc. Amer., 4 (1911), No. 2, pp. 181–185*).—It is stated that cherry and plum trees in Iowa suffered much injury nearly every year by the common pear slug, the foliage frequently being greatly damaged before the presence of the slugs is noticed. Young cherry trees in the town of Ames have been killed as a result of defoliation following the injury by the slugs.

In this paper the author deals with the past history and distribution, life history, natural enemies, and experiments with insecticides. *Pentarthron minutum* is the most common egg parasite of this pest but *Closterocerus cinctipennis* was reared in equal abundance from eggs collected at Ames in 1909 and 1910. *Podisus maculiventris* was found to be a very active enemy in 1910.

In experiments with insecticides, the author found a 10 per cent solution of kerosene emulsion to be quite effective; several simple soap solutions were effective at concentrated strengths. Paris green, 1 lb. to 150 gal. of water, was also effective.

Note on Theronia fulvescens, J. M. ALDRICH (*Jour. Econ. Ent., 5 (1912), No. 1, pp. 87, 88*).—These notes relate to *T. fulvescens* as a parasite of *Neophasia menapia*, the white butterfly of western pine and fir.

This butterfly began to be noticeably abundant near Moscow, Idaho, in 1895. In 1896, 1897, and 1898 it caused much loss in the forests of the Northwest by completely defoliating pine and fir timber in considerable areas, while in all the intervening forests it was very abundant also. The parasite appeared and reached its maximum in 1898, at which time it swarmed in the woods in late summer in incredible numbers.

It is stated that the following spring the extermination of *N. menapia* seemed complete all over the Northwest. Only in the last 2 or 3 years has it reappeared and now seems to be at the beginning of another cycle of abundance.

Two new Hymenoptera, J. C. CRAWFORD (*Proc. Ent. Soc. Wash., 13 (1911), No. 4, pp. 233, 234*).—*Thripoctenus russelli* n. g. and n. sp., reared from *Heliothrips fasciatus* at Compton, Cal., and *Tetrastichus doteni* n. sp., the larvæ of which feed readily on *Habrobracon hebetor* and Meraporus and occasionally on Pteromalus, are here described.

Scale insect parasitism in California, H. J. QUAYLE (*Jour. Econ. Ent., 4 (1911), No. 6, pp. 510–515*).—This paper presents a brief account of the present status of scale parasitism in California.

Notes on the life history of the tick parasite, Hunterellus hookeri, H. P. WOOD (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 425–431, pl. 1*).—It is stated that in addition to having been reared from engorged nymphs of the brown dog tick (*Rhipicephalus sanguineus*), this parasite has also been reared from a nymph from the rabbit Dermacentor (*Dermacentor parumapertus marginatus*), col-

lected on a jack rabbit at Green Valley, Cal. "To date the species has been taken at Corpus Christi and Brownsville, Tex., also Green Valley, Cal., in the United States, and from Monterey, Mexico, and from Lourenço Marquez, Portuguese East Africa."

Observations made show that the parasitism varies considerably in the same locality. In records of parasites reared, here presented in tabular form, the maximum number of parasites per tick was 17, the minimum 3, and the average 8. It took from 20 to 67 days, with an average of 32, from the date of collection for the adult parasites to emerge.

The acariasis of the vine, E. PANTANELLI (*Marcellia, 10 (1911), No. 4, pp. 133–150, figs. 16*).—An account of the occurrence and nature of the injury of the grapevine caused by *Phyllocoptes vitis*.

A new species of Dermacentor and notes on other North American Ixodidæ, F. C. BISHOPP (*Proc. Biol. Soc. Wash., 25 (1912), pp. 29–37, pl. 1*).—*Dermacentor hunteri*, the species here described as new, was taken in numbers on mountain sheep (*Ovis mexicanus*), at Quartzsite, Ariz.

A serious chicken pest (Argas miniatus), E. K. CARNES (*Mo. Bul. Com. Hort. Cal., 1 (1912), No. 4, pp. 136–139, fig. 1*).—This is a brief account of the fowl tick (*A. miniatus*).

This tick was first reported from Merced County in 1894. Later reports from the vicinity of Sacramento and San Joaquin counties show the presence of the pest in alarming numbers and causing serious damage to fowls.

The use of sweetened poisons against the grape root-worm and the rose chafer, F. Z. HARTZELL (*Jour. Econ. Ent., 4 (1911), No. 5, pp. 419–422*).—This is a brief report of results obtained in 1911 in continuation of the investigations previously noted (E. S. R., 24, p. 751).

The additional data secured are said to confirm the author's first claims and to show that even better results may be secured by using 2 gal. of molasses instead of 1 gal. Experiments with the grape root-worm "show that the use of the molasses-arsenate of lead mixture gives superior results, since the inability to cover all the foliage is balanced by the habit of the beetles seeking the sweet and also the insects are killed instead of being driven to other vines as appears to be the case with other mixtures. The formula we recommend is 6 lbs. of arsenate of lead, 2 gal. of molasses, and 100 gal. of water."

The behavior of the rose chafer toward arsenate of lead alone or with Bordeaux mixture is similar to that of the root-worm, as has been determined by cage experiments and field observations. The use of molasses with arsenate of lead in Bordeaux mixture gave the same results as when the arsenate of lead and Bordeaux were used alone.

Carbon disulphid explosion from heated corn, W. E. HINDS (*Jour. Econ. Ent., 4 (1911), No. 6, pp. 532–535*).—An explosion of carbon disulphid used in fumigating unhusked corn in a concrete room is described. "It seems certain that the large mass of wet corn in the concrete building, from which moisture could escape only upward, was at the time of treatment undergoing a heating which produced a temperature of at least 300° F. in some part of the mass. This high temperature started the explosion as soon as the vapor of the liquid poured on top of the corn had penetrated to a point where such heat occurred."

It is stated that the injury to the grain was not great, although the shucks or husks were burned more or less on several hundred bushels of corn.

Methods of determining the toxicity of hydrocyanic-acid gas, G. A. COLEMAN (*Jour. Econ. Ent., 4 (1911), No. 6, pp. 528–531, pls. 2*).—The author presents a description of the apparatus and methods developed during the course of fumigation investigations at the California Station.

The parasite fauna of Colorado, M. C. HALL (*Colo. Col. Pub., Sci. Ser., 12 (1912), No. 10, pp. 329–383, fig. 1; abs. in Science, n. ser., 35 (1912), No. 901, pp. 554, 555*).—This paper consists of an annotated list of the parasites recorded from Colorado (pp. 336–368), arranged alphabetically under their respective groups, and a compendium of the parasites listed, arranged according to their hosts. "Using the word 'identified' to indicate at least a generic identification, the list includes at present a total of 251 identified and 27 unidentified species of protozoan, trematode, cestode, nematode, crustacean, mallophagan, hemipterous, dipterous, siphonapteran, arachnid, and annelid parasites."

A bibliography of the literature on the subject is appended.

Handbook of pathogenic protozoa, edited by S. VON PROWAZEK (*Handbuch der Pathogenen Protozoen. Leipsic, 1911, pt. 2, pp. 119–248, pls. 2, figs. 39*).—The second part of this work (E. S. R., 26, p. 246) deals with the subject as follows: Chlamydozoa (general) (pp. 119–121), by S. von Prowazek and B. Lipschütz; vaccine (pp. 122–138); variola (pp. 139–152); virus myxomatosum (pp. 153–155); flacherie [Gelbsucht (Polyederkrankheit)], (pp. 156–161), by S. von Prowazek; epitheliosis desquamativa conjunctivæ of the South Sea (pp. 162–171), by A. Leber and S. von Prowazek; trachoma and chlamydozoan diseases of the mucous membrane (pp. 172–195), by L. Halberstaedter; rabies (pp. 196–218), by Maresch; molluscum contagiosum (pp. 219–229); epithelioma contagiosum (pp. 230–242), and an appendix on the Chlamydozoa-Strongyloplasmen (pp. 243–247), by B. Lipschütz.

A bibliography is appended to each paper.

FOODS—HUMAN NUTRITION.

Rice as food—Investigation of the nitrogen and phosporus metabolism on a diet consisting principally of rice and other vegetable foodstuffs, H. ARON and F. HOCSON (*Philippine Jour. Sci., B. Med. Sci., 6 (1911), No. 5, pp. 361–381*).—These studies were made in the Philippine Islands, the subjects for the metabolism experiments being medical students and Malay prisoners in the Bilibid prison.

The phosphorus and nitrogen content of rice has been determined in 28 different classes, the results as here summarized showing that the phosphorus content, within narrow limits, is determined by the grade of milling. The whiter the rice the poorer it is in phosphorus. The nitrogen content of rice differs considerably less than the phosphorus content, but the more intensively a given rice is milled the poorer it becomes in nitrogen. Judging by the phosphorus content of rice, there are 3 stages of milling to be distinguished: Rice, husked only, from 0.7 to 0.8 per cent phosphoric anhydrid; undermilled rice, from 0.45 to 0.6 per cent; and overmilled rice, from 0.15 to 0.35 per cent.

The question of rice as food is particularly important in Asia and Malasia, as there it forms the bulk of the ordinary diet.

"Several authors point out the fact that a diet consisting for the greater part of rice must of necessity be very voluminous. This idea is based on the supposition that the rice-eating native cooks his rice in the same way as the European. Scheube has shown this to be erroneous. Our own observations as well as those of other residents in the Orient prove that the Japanese, Chinese, and Malays cook rice with so little water that, although the grain becomes softened, it remains apparently dry. In carrying on metabolism experiments, we have weighed, twice daily for 10 days, rice prepared by natives. This was done before and after cooking, and we found that within narrow limits 100 gm. of uncooked rice gives about 250 gm. of cooked rice. Rarely is more than 300 gm. of rice, which cooked would weigh 750 gm., taken at one meal. This is not a

very great amount, especially when we consider that the Malay at least, and, we believe, the Chinese and Japanese also, seldom drink with their meals; the majority of them drink afterward, and even then only small quantities. An average European very frequently drinks as much as 1 liter of liquid with each meal, so that his meal certainly is a much more voluminous one than that of the rice-eating Oriental."

As a result of their metabolism experiments, the authors reach the following conclusions:

"It was not possible to establish nitrogen equilibrium, even in cases where the nitrogen intake was comparatively high, if the number of calories taken was below 1,800 for 50 kg. of body weight; on the other hand, if the number 1,800 was equaled or exceeded, then 9 gm. of nitrogen per 50 kg. of body weight were sufficient. If a less quantity of nitrogen then the above figure was taken with the food, then the loss of nitrogen exceeded the amount taken, even if the number of calories reached 2,200. However, with an intake of 5 to 6 gm. of nitrogen, the deficit amounted to less than 2 gm. Consequently, we are justified in concluding that in some instances 8 gm. of nitrogen per 50 kg., or 0.16 gm. per kilogram of body weight, are sufficient. This value is higher than the lowest limit found by other authors, who succeeded in establishing nitrogen equilibrium on 0.1 gm. per kilogram of body weight. . . .

"While it is not possible to establish an exact phosphorus minimum, just as it is impossible to establish a nitrogen minimum, our experiments show that an intake of less than 1.65 gm. of phosphorus per 50 kg. of body weight, or 0.033 gm. phosphoric anhydrid per kilogram, is insufficient to cover the demand of the body for phosphorus. The quantities given by most authors are considerably higher than this figure. . . . A diet consisting of white rice, bread, bacon, and other foodstuffs poor in phosphorus does not cover the demand of the body for that element, even with the addition of small quantities of fish. However, the phosphorus balance becomes positive if unpolished rice, rice bran, or phytin is added to the food. . . . The body loses phosphorus when on a diet consisting mainly of white rice, while on the same diet, red rice being substituted, the amount of that element exceeds the demand of the body."

The experiments of other investigators on the so-called "tone" of the "catabolic cell metabolism" suggested that the "tone" of the cell metabolism of the ordinary Malay must be very low. Attempts were made to conduct experiments with mental rest and mental work, and to note differences in phosphorus metabolism, but without satisfactory results, partly on account of the unwillingness of the subjects to apply themselves for more than short periods.

Action of heat on the peroxydiastase of wheat grains at different stages of ripening, A. KHRENNIKOFF (*Compt. Rend. Soc. Biol. [Paris], 72 (1912), No. 5, pp. 193, 194*).—In all the samples examined the resistance of peroxydiastase to heat was found to be the same. In extracts of crushed grain filtered through fine cloth a temperature of 70° maintained for 10 minutes produced a decrease of peroxydiastatic activity; a temperature of 80° maintained for 10 minutes destroyed peroxydiastase, as did also a temperature of 85° maintained from 3 to 5 minutes. Unfiltered extracts required a greater degree of heat maintained for a longer time to produce this effect.

The causes of the modification of the quality of gluten during the heating of the grain, J. APSIT (*Compt. Rend. Soc. Biol. [Paris], 72 (1912), No. 5, pp. 195, 196*).—Studies of the effect of heating upon gliadin and glutenin.

Acidity in wheat flour, J. W. CALVIN and LELIA DUNTON (*Dixie Miller, 37 (1912), No. 3, pp. 38, 39*).—A discussion of the cause of acidity in flours and the question whether acidity is to be considered a mark of poor quality.

"A high acidity value does not necessarily mean that the flour is made from unsound wheat. It means that it contains a large proportion of those streams which should go into a lower commercial grade or that the method of milling in regard to cleaning or purification is faulty."

Experiments and observations on bread, with special reference to the causation and prevention of dental caries, J. S. WALLACE (*Proc. Roy. Soc. Med.* [*London*], *Odontol. Sect.*, *4* (*1911*), *No. 8, pp. 90–104*).—From this experimental study the author concludes in general that "the cause of dental caries is the undue lodgment of fermentable but nondetergent carbohydrates in more or less immediate contact with the teeth, and undisturbed by the free access of saliva."

With reference to bread, he believes that "no farinaceous foodstuff in general use in this country is less harmful to the teeth than bread when eaten with butter, and no farinaceous foodstuff is more beneficial from the point of view of oral hygiene; especially is this the case when the bread is eaten wtih a goodly proportion of crust.

"The different varieties of bread (i. e., white, standard, and stone-milled) make no appreciable difference in inducing dental caries, beyond the difference which the physical differences of the bread make in their detergent effects on the teeth. That is to say, the less finely ground may be presumed at least to have the more detergent effect."

As regards the detergent effect, "the crust is always preferable to the crumb in all varieties of bread. Similarly, toasted bread of any variety is preferable to untoasted bread of any variety."

The paper is followed by a discussion.

Action of dissolved substances upon the autofermentation of yeast, A. HARDEN and S. G. PAINE (*Proc. Roy. Soc.* [*London*], *Ser. B*, *84* (*1912*), *No. B 574, pp. 448–459, dgms. 2*).—The production of carbon dioxid by autofermentation of yeast is brought about, the authors point out, by the action of at least 2 enzyms. "The reserve material of the cell, for the most part glycogen, is first converted by a glycogenase into a sugar, which in turn is fermented by zymase with the production of alcohol and carbon dioxid. As the rate of autofermentation is considerably less than that produced by the same yeast in presence of excess of sugar, it follows that the rate of autofermentation is controlled by the rate of production of sugar within the cell, in other words, by the rate of action of the glycogenase. An increase in the rate of autofermentation, therefore, indicates greater activity in this enzym within the cell."

The effect of solutions of various sorts on the autofermentation of yeast was studied.

Some of the conclusions follow:

"All dissolved substances which plasmolyze the yeast cell also cause a large increase in the rate of autofermentation. . . .

"The effect produced by salts is probably a direct result of the concentration of the cell contents due to plasmolysis, but in the case of toluene it is possible that some other factor (such as disorganization of the cell, or hormone action) is concerned."

Spices, prepared mustard, honey, and gluten flour, C. D. WOODS (*Maine Sta. Off. Insp. 34, pp. 109–124*).—The results of the examination of a number of samples are reported.

The chemical action of organic acids of canned goods upon tin, A. BARILLÉ (*Jour. Pharm. et Chim., 7. ser., 4* (*1911*), *No. 9, pp. 396, 397; abs. in Zentbl. Biochem. u. Biophys., 12* (*1912*), *No. 15–16, p. 704*).—Data regarding the action on canned goods of such organic acids as sarcolactic acid and of acid salts are presented.

Saccharin in food (*U. S. Dept. Agr., Food Insp. Decision 142, pp. 2*).—In explanation of the conclusion that the use of saccharin in normal foods within the jurisdiction of the Food and Drugs Act is a violation of the law and will be prosecuted, it is stated that "it is plain, from the finding of the referee board, that the substitution of saccharin for sugar lowers the quality of the food. The only use of saccharin in foods is as a sweetener, and when it is so used it inevitably displaced the sugar of an equivalent sweetening power. Sugar has a food value and saccharin has none. It appears, therefore, that normal foods sweetened with saccharin are adulterated under the law. . . .

"A product containing saccharin and plainly labeled to show that the mixture is intended for the use of those persons who, on account of disease, must abstain from the use of sugar, falls within the class of drugs and is not affected by this decision."

A new vegetable adulterant, H. KRAEMER (*Amer. Jour. Pharm., 83 (1911), No. 8, pp. 377–381, fig. 1*).—A study of the outer layers of the pericarp of the fruit of *Juglans regia*, recently introduced as an adulterant in place of walnut shells, olive pits, etc., is reported and methods of detection outlined.

Pure-food laws of the State of Indiana and the rules of the state board of health regulating their enforcement, compiled to May 1, 1911 (*Indianapolis, [1911], pp. 63*).—The text of the pure-food laws.

The food, drug, and dairy laws of the State of Nebraska and rules and regulations of their enforcement, compiled at the end of the legislative session, 1911 (*University Place, Nebr., 1911, pp. 81*).—The text of the food, drug, and dairy laws and rules and regulations of their enforcement are given.

Texas food and drug law (*Austin, Tex., 1911, pp. 9*).—The text of the food and drug law.

Food sanitation (*Maine Sta. Off. Insp. 35, pp. 125–136*).—Information is summarized, secured as a result of the inspection of a number of food factories, bakeries, creameries, drug stores, hotels, restaurants, and other similar places. Some data are given regarding the analysis of foods under the state pure food law and also regarding the examination of oysters and clams.

In discussing the marketing of clams, it is stated that the practice of soaking the opened clams in fresh water results in a swelling of the clam meat similar to that obtained when oysters are floated. The difference in composition of fresh clam meat and soaked clams is illustrated by analyses showing that the drained meat of fresh clams opened in the laboratory contained 24.9 per cent of total solids as compared with 15.9 per cent dry matter in clams from a lot which had been soaked. In some of the clams analyzed the dry matter "ran as low as 12 per cent.

"There is no reason why clams should not be sold in as solid a condition as oysters are sold at the present time. Clams which are properly dug, washed, opened, rinsed, and drained will not carry much, if any, more free liquid than the best oysters which are found upon the market at the present time, and clams which are not soaked in any way should contain at least 20 per cent total dry matter."

The diet of Trappist monks, L. H. VAN ROMUNDE (*K. Akad. Wetensch. Amsterdam, Versl. Wis en Natuurk. Afdeel., 19 (1910–11), pt. 2, pp. 1406, 1407; noted in Bibliographia Physiol., 3. ser., 7 (1911), No. 3, p. 226*).—As the author points out, a Trappist community is very largely self-supporting since it makes most of the materials it uses. The brothers supervise and the lay brothers carry on the work. Bread, potatoes, and buttermilk are the principal foodstuffs with green vegetables, dairy products, oil, and vinegar. Beer, coffee, and a little fruit are sometimes used. During 70 days in the year the food

consists of vegetable products exclusively or of vegetables with milk products. The diet is much like that of farmers in the same region, though somewhat better, in the author's opinion. The dietary study reported covered 1 week.

According to the author's calculations, the brothers' diet supplied 130 gm. of protein and 3,500 calories of energy per day and that of the lay brothers 155 gm. of protein and 4,540 calories. The work of the brothers was light to moderate and that of the lay brothers severe, being equivalent, the author estimates, to 3,300 and 4,250 calories, respectively. The average body weight was about 70 kg. The diet though simple is regarded as palatable and satisfactory.

A study of the creatin excretion did not show that it bore any direct relation to the diet or to the amount of work performed.

Feeding experiments with cleavage products of nutrients—solution of the problem of the artificial synthesis of nutrients, E. ABDERHALDEN (*Hoppe-Seyler's Ztschr. Physiol. Chem., 77 (1912), No. 1, pp. 22–58*).—Continuing previous work (E. S. R., 22, p. 769), the author found it possible to sustain the organism on a diet consisting exclusively of the final cleavage products of various proteins.

Experiments were also made in which monosaccharid and a mixture of glycerin fatty acids were used with protein cleavage products. From his experimental data the author reaches the important general conclusion that the animal body can build up all its cell constituents from the simplest nutrient substances.

The author finds that a protein which contains amino acids in a proportion unlike that found in the body tissues is not so well utilized as one which under hydrolysis yields them in the quantities in which they are found in cell protein. From this point of view most plant proteins are less well utilized than those of animal origin; and less protein of animal origin is required by the organism.

The practical application of this seems to the author to be in favor of a mixed diet. In general, the animal organism is able to build up all its parts from the simplest cleavage products, being much better able to accomplish such synthesis than is generally supposed. The question arises whether chemistry to-day is in a position to reproduce all the cleavage products in the laboratory. According to the author, this is quite possible, and only time and money are required to complete the demonstration.

Under ordinary conditions the fact that nutrients and their cleavage products may be artificially produced is not likely to be of great practical importance, but in therapeutics, etc., the author believes that, in the future, artificial preparations of cleavage products will be used for all subcutaneous and intravenal applications. An appendix contains the results of studies of several protein cleavage products.

Protein metabolism from the standpoint of blood and tissue analysis, I, O. FOLIN and W. DENIS (*Jour. Biol. Chem., 11 (1912), No. 1, pp. 87–95*).—The work here reported is an attempt to discover the fate of the amino acids formed in the intestine as a result of the digestion of protein.

According to the authors, nearly all previous workers, besides being hampered by the lack of suitable analytical methods for investigating the nonprotein nitrogen of blood, "have conducted their investigations from a point of view which almost completely eliminated the possibility of accounting for the amino acids absorbed as such from the digestive tract. The blood has been regarded as essentially a closed system, closed physiologically as well as anatomically, and except for the supposed effective deamidizing power of the liver they have worked on the assumption that the amino acids absorbed from the intestine should heap up in the blood to such an extent that they could

not fail to find them. As a matter of fact the nonprotein nitrogen of blood does rise and sink like a tide with reference to absorption from the digestive tract and the variations appear to be adequate to account for all the nitrogen when considered from the right point of view.

"An all-important function of the blood is to transport food from the digestive tract to every tissue in the body; this being so there is a priori no reason why the transport of the amino acids from the blood to all the various organs should be less prompt than the transport of those same amino acids from the digestive tract into the blood."

In connection with their work the authors found "that while the liver almost wholly abstracts the ammonia from the portal blood and probably converts it into urea, it does not 'deamidize' the amino acids." This discovery led to the hypothesis that the blood promptly transports the amino acids from the intestine to every tissue in the body.

Experiments were made with cats, in which solutions of urea, glycocoll, pancreatic digestion mixture, and egg albumin were injected. Each animal was etherized, and a sample of blood taken from the right carotid artery and from the portal vein. Ligatures were applied to prevent the escape of the materials under absorption, and 45 minutes after injection the blood was again tested.

The authors conclude as follows:

"We have confined ourselves to the presentation of analytical results which seem to show what becomes of the amino acids absorbed from the intestinal tract. The muscles and other tissues as well evidently serve as a storehouse for such reserve materials. The existence of such a reservoir must be taken into account in our theories of protein metabolism, for it certainly ought to make at least some points clear which were not clear before. The peculiar lag extending over several days in the establishment of a constant level of nitrogen elimination when extreme changes are made in the nitrogen intake is probably due to a filling or a depletion, as the case may be, of the reservoir. The different results obtained when a single substance like creatin or an amino acid is fed together with diets rich or poor in nitrogen would also be determined by the condition of the reservoir. When full the creatin is eliminated and the amino acid augments the urea output; when nearly empty both are retained. . . .

"The analytical methods used are adaptations of colorimetric methods for the determination of nitrogen, urea, and ammonia in urine. None of these have as yet been published in detail."

Protein metabolism from the standpoint of blood and tissue analysis.—II, The origin and significance of the ammonia in the portal blood, O. FOLIN and W. DENIS (*Jour. Biol. Chem., 11 (1912), No. 2, pp. 161–167*).—The authors refer to previous work and suggest the need of more refined analytical methods in studying the question. The experiments which they carried on were made by methods similar to those referred to above.

They conclude that the large intestine clearly is the chief or at least the most constant source of the ammonia found in the portal blood, and that it is also the chief seat of bacterial action. Since many of the bacteria, such as the *Bacillus coli*, rapidly produce ammonia from albuminous materials, especially in the absence of carbohydrates, the condition in the large intestine is ideal for the production of ammonia. "Further, since the large intestine is practically never empty, there are always present the conditions for this ammonia formation, and that is why the ammonia in fasting animals is often as abundant in the portal blood as during digestion."

The total amount of ammonia which reaches the portal blood, it is pointed out, is, as the experiments show, not very large, and in the authors' opinion it is extremely unlikely that this ammonia is the cause of the disturbance pro-

duced by meat feeding in dogs with an Eck fistula which has been noted. "On the other hand, since this ammonia is not elaborated in the walls of the intestine as a part of the normal animal metabolism, but clearly comes straight from the fecal matter in the large intestine, it is not at all strange that dogs with Eck fistulas do not thrive on much meat. No one would suppose that the ammonia is the only product absorbed from that region. The Eck fistula dogs seem to furnish the first really definite illustration of 'auto-intoxication' by way of the large intestine. The definitely fecal breath met with in many persons with 'indigestion' acquires a somewhat unpleasantly definite significance in this connection.

"Whether this and other symptoms of indigestion are due to the excessive production of putrefactive decomposition products in the large intestine or to an unusual failure of the liver to render those products harmless is an open question. But it looks at all events as if one of the most important functions of the liver is to dispose of the toxic materials coming from the large intestine.

"As an essential part of animal metabolism the portal ammonia is hereby largely robbed of the peculiar interest which has been attached to it for the past 15 years, and since the amount of ammonia in other blood is almost infinitesimal under ordinary normal conditions this too becomes a rather unimportant feature of normal metabolism. The ammonia in the tissues, the ammonia of experimental acidosis, and certain obvious clinical applications remain to be investigated. We have already begun on this work, but some little time will necessarily elapse before we can report upon it."

Contributions to the study of beri-beri, M. G. Lebredo (*Saidad y Benefic., Bol. Of. Sec.* [*Cuba*], *6* (*1911*), *No. 5–6, pp. 643–645*).—Notes on cases of beri-beri observed in Cuba.

The author believes that cases caused by starvation, akin to scurvy and characterized by a polyneuritis should be distinguished from true beri-beri, although similar anatomically. A bacteriological study of samples of rice eaten by beri-beri patients showed the presence of numerous spores capable of resisting a temperature of 100° C., continued for 20 minutes. Cultures of these were made and intraperitoneal and intradural injections caused the death of guinea pigs in a few hours. Subcutaneous injections and injections by the mouth produced no immediate effect. In the latter case, however, if the gastric mucus membrane was previously irritated, death was produced by the injection, with the same symptoms as in the case of peritoneal injections.

Maize diet and sunlight in reference to the photodynamic theory of pellagra, P. Rondoni (*Sperimentale, 65* [*1911*], *pp. 307–316; abs. in Zentbl. Biochem. u. Biophys., 12* (*1912*), *No. 17–18, p. 716*).—The author was not able to detect an increased effect of maize diet due to light.

Researches into the carbon dioxid output with static and negative muscular work, E. Hammarsten (*Skand. Arch. Physiol., 26* (*1912*), *No. 1–3, pp. 212–220, figs. 4, dgms. 2*).—Continuing work by Johansson (E. S. R., 13, p. 580, and 14, p. 992), and using a similar respiration apparatus and ergometer, the author attempted to discover whether any difference can be experimentally determined between the muscle processes during negative and static work as measured by the carbon dioxid output. He concludes that negative work is accompanied by no other carbon dioxid output than that which corresponds to the maintenance of muscular contraction.

Expenditure of energy in walking, J. Amar (*Jour. Physiol. et Path. Gén., 13* (*1911*), *No. 2, pp. 213–219, figs. 4*).—The subjects referred to in the experi-

ments here reported were men of normal health from 30 to 40 years of age. Chauveau's respiration apparatus was used with slight modifications.

The carbon dioxid eliminated was measured when the subject was sitting, standing, lifting his feet alternately without moving from the spot, walking over an 11-meter track without a burden, and walking with a knapsack weighing 7½ kg. on his shoulders. The excess of carbon dioxid eliminated when standing, walking, etc., over that eliminated when the subject was merely sitting was taken as the measure of energy expenditure for the various exercises. The length of the step and the number of steps per minute were noted.

In walking without a knapsack a rate of 130 steps per minute and each 0.517 meter long was found to involve the most economical consumption of oxygen. This the author estimates corresponds to walking at the rate of about 4.5 kilometers (2.8 miles) per hour. Increasing the rate above this produced a rapid increase of expenditure, that at 7 kilometers per hour being twice that at 4.5 kilometers. When the knapsack was worn the most economical rate was found to be 2.5 kilometers per hour, but the increase in energy expenditure did not become great until 4.5 kilometers had been reached. After that the rise was rapid. (See also E. S. R., 25, pp. 269, 270.)

Energy expenditure in walking as affected by speed and burden carried, E. Brezina and W. Kolmer (*Biochem. Ztschr., 38 (1912), No. 1–2, pp. 129–153, dgms. 9; abs. in Zentbl. Biochem. u. Biophys., 12 (1912), No. 19–20, p. 788*).—The respiratory quotient was measured with a portable respiration apparatus.

Among the conclusions drawn are the following: The most economical speed for a subject walking without burden or carrying a light load (up to 21 kg.) was found to be about 85 meters (about 279 ft.) per minute, the value being lower when a heavier load was carried. With increased burden the respiratory volume per minute was increased both as to frequency and depth of respiration.

A new form of differential microcalorimeter, for the estimation of heat production in physiological, bacteriological, or ferment actions, A. V. Hill (*Jour. Physiol., 43 (1911), No. 3–4, pp. 261–285, dgms. 11*).—A microcalorimeter of special construction is described and experiments briefly reported on various topics, among them the heat production during the souring of milk; the heat production of yeast cells acting on cane sugar, particularly the effect on heat production of increasing the concentration of the sugar used; and the action of saliva on starch.

In the last mentioned tests attention is directed particularly to the fact that the heat production is extraordinarily small. "The combustion energy of starch is some 5,000 calories per gram. The heat lost in the transformation of starch into maltose we know is very small; that it should be so small however—only some 1/10,000 of the total energy of the starch—speaks very suggestively as to its suitability to the plant as a store of energy. Starch and maltose seem to be mutually transformable, practically without energy changes of loss—just as pence into shillings and shillings into pence."

Calorimetric methods, W. Glikin (*Kalorimetrische Methodik. Berlin, 1911, pp. VII+208, figs. 51*).—Heat of combustion, heat of solution, calorimeters, methods of making corrections in calculating the heat loss of calorimeters, methods for estimating heat of combustion, adiabatic calorimeters, measuring the heat production of the animal body, and other similar topics are considered in this summary of data. Tables are also given showing the heat of combustion of a large number of organic compounds and foodstuffs, the heat of solution of organic compounds, and similar data.

Apparently, the author's attention has not been directed to some of the later calorimetric work carried on in the United States.

ANIMAL PRODUCTION.

Treatise on zootechny.—I, General zootechny, P. DECHAMBRE (*Traité de Zootechnie.—I, Zootechnie Générale. Paris, 1911, 2. ed., rev., pp. XI+427, figs. 7*).—A new and revised edition of a treatise of general interest to animal husbandmen. The principal topics treated are growth, reproduction, production of meat, milk, and wool, variation, heredity, and the improvement of animals by breeding.

Zootechnical associations in Italy and foreign countries (*Ann. Agr. [Italy], 1911, No. 267, pp. CXXII+421*).—The organization of live-stock associations in Italy is described in detail. The principal associations of other countries are briefly described.

[Analyses of feeding stuffs], R. E. ROSE and E. P. GREENE (*Fla. Quart. Bul. Dept. Agr., 22 (1912), No. 1, pp. 72–94*).—Analyses are reported of wheat, cotton-seed meal, molasses feeds, East Coast grass, ground clover, royal palm seed, wheat bran, wheat middlings, ship stuff, gluten feed, alfalfa meal, rice flour, and proprietary mixed feeds.

Molasses and molasses feeds, J. E. HALLIGAN (*Amer. Hay, Flour, and Feed Jour., 20 (1912), No. 5, pp. 17–20*).—A summary of information on the value of molasses feeds for live stock, including an account of the chemical nature of the materials used and a compilation of analyses of molasses and molasses feeds.

The lime and phosphorus content and nutritive value of hay and straw, H. NEUBAUER and G. HILLKOWITZ (*Landw. Ztschr. Rheinprovinz, 13 (1912), No. 8, pp. 111, 112*).—Percentages of lime and phosphorus in meadow hay, alfalfa, oat straw, wheat straw, rye straw, and barley straw are reported.

On the question whether dextrose arises from cellulose in digestion, G. LUSK (*Amer. Jour. Physiol., 27 (1911), No. 5, pp. 467, 468*).—In both the dog and cat the ingestion of cellulose did not increase the sugar content of urine when the animals were phlorhizinized.

The chemical and physiological examination of the liver of oxen, A. DANIEL-BRUNET and C. ROLLAND (*Compt. Rend. Acad. Sci. [Paris], 153 (1911), No. 19, pp. 900–902; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 590, II, p. 1111*).—"The livers of the animals gave water 689 to 755.2; ash free from carbon, 16.2 to 20.49; glycogen, 28.8 to 83.4; carbamid, 0.615 to 0.683; P_2O_5, 2.9 to 3.48; chlorids (as NaCl), 1.95 to 2.86. The figures represent parts per 1,000 of fresh substance. . . . The bile of oxen gave the following analytical results, stated to be more complete than any hitherto published. The weights are in grams per kilogram of fresh material. The amount of bile from one animal varied from 395 to 630 cc. It had D^{17} 1.024 to 1.027, and gave an extract, dried in a vacuum, of 90.3 to 90.5; dried at 100°, 88.5 to 92.5; at 110°, 86.8 to 89.6. Ash, 12.5 to 14.3; chlorids (as NaCl), 2.38 to 2.68; P_2O_5, 1.31 to 1.58; Fe, 0.016 to 0.018. Nitrogen, 2.3 to 2.5; fat, 27.8 to 28.8; bile salts (sodium glycocholate and taurocholate), 15.3 to 15.8; nucleoprotein, 1.15 to 2.25; lipoids, 1.1 to 2.13. The latter contained cholesterol, 0.41 to 0.813, with lecithin and neutral soaps 0.69 to 1.317."

Cattle feeding and soil improvement (*Breeder's Gaz., 61 (1912), No. 9, pp. 519, 520, figs. 9*).—An editorial on the mixed farming methods practiced in Pike County, Ill., where exclusive grain growing has been abandoned for a system of mixed farming and steer raising. The yield of wheat, corn, and clover has increased enormously since the change.

The Tuxer (Duxer) breed of cattle, ULMANSKY (*Wiener Landw. Ztg., 62 (1912), Nos. 14, pp. 157–159; 15, pp. 177, 178, figs. 2*).—The measurements and characteristics of this breed of cattle are given.

European markets for meat, J. E. RICHELET (*Bol. Min. Agr. [Buenos Aires]*, *14 (1912)*, *No. 1, pp. 74–126*).—A general and statistical account of the cattle production of Argentina, and the meat consumption in different countries of Europe.

The live-stock situation in 1909 and 1910 (*Bul. Agr. et Hort. [Brussels]*, *1 (1912)*, *No. 7, pp. 351–364*).—This contains data on Belgian imports and exports of breeding animals, and other statistical matters relating to the improvement of breeding stock.

[Feeding trials with sheep], J. H. SKINNER (*Indiana Sta. Rpt. 1911, pp. 19, 20*).—A progress report of a feeding trial with fattening sheep lasting 90 days.

All lots were fed shelled corn. The gains per head and day and costs of the different supplements were as follows: Timothy hay, 0.198 lb., at a cost of 6.45 cts. per pound; cotton-seed meal and timothy hay, 0.293 lb., at a cost of 5.39 cts. per pound; clover hay, 0.326 lb., at a cost of 4.92 cts.; cotton-seed meal and clover hay, 0.343 lb., at a cost of 5.06 cts.; silage and clover hay, 0.342 lb., at a cost of 4.44 cts.; cotton-seed meal, silage (in morning), and clover hay (evening), 0.334 lb., at a cost of 4.92 cts.; and cotton-seed meal, silage (morning and evening), and clover hay (evening), 0.339 lb., at a cost of 4.66 cts. per pound.

The types of caracul breeds, L. ADAMETZ (*Mitt. Landw. Lehrkanz. K. K. Hochsch. Bodenkul. Wien, 1 (1912)*, *No. 1, pp. 57–89, figs. 2*).—The character of the different subbreeds of caracul sheep is discussed in detail, and some observations of Young (E. S. R., 25, p. 675) are criticized.

The "stone" sheep, L. FÜHRER (*Mitt. Landw. Lehrkanz. K. K. Hochsch. Bodenkul. Wien, 1 (1912)*, *No. 1, pp. 91–114*).—Measurements and descriptions of these sheep and their crosses, which are native to the Austrian Alps, are given.

Suffolk sheep, E. PRENTICE (*Suffolk Sheep Soc. Flock Book, 25 (1911), pp. XIII–XXXII*).—A brief account of the origin, history, and characteristics of this breed of sheep.

The wool yearbook, 1911 (*Manchester, 1911, pp. XLIX+468, figs. 112*).—This manual is now in its third year of issue. It contains a brief history of the woolen industry, a classification of raw wools, statistics on the wool trade, technical information on weaving and other processes in the manufacture of worsted and woolen goods, and a glossary of terms used in the woolen industry.

Fattening hogs in Nebraska, W. P. SNYDER (*Nebraska Sta. Bul. 123, pp. 40, figs. 7*).—A continuation of earlier work (E. S. R., 25, p. 675).

Of the many rations tried for fattening hogs none were equal to a combination of corn and a small percentage of unchopped alfalfa in the ratio of about 9:1. The substitution of 5 parts tankage, 5 parts bone meal, or 25 parts shorts, for corn, in a ration containing 90 parts corn and 10 parts chopped alfalfa, increased the cost of gains and decreased the profit per pig during the fattening period. The substitution of 25 parts emmer, barley, wheat, or milo, for corn in the ration increased the cost of gains and decreased the profit per hog during the fattening period, excepting emmer, which in this test increased the profit per hog and the gain. The result of one test indicated that a bushel of corn was worth as much as a bushel and a half of sorghum seed when fed with alfalfa for fattening hogs.

"Where fall pigs were wintered and turned on alfalfa pasture in the spring, there was more profit per pig from those grown out largely on pasture and then fattened than from those fed out more quickly. Four seasons' records show that old sows being fattened on corn and alfalfa pasture gained 2 lbs. per head

daily, ate 355 lbs. of corn for 100 lbs. of gain, and gave a net profit of over 5 cts. each daily.

"A summary of the [earlier] results, together with data from this bulletin, indicates that the cost of feed to produce a 225-lb. market hog was $3.35 per 100 lbs., and that keeping the hog until it weighed 325 lbs. increased the cost to $3.57 per 100 lbs. This includes only the cost of feed and does not include the cost of labor, equipment, unusual risk, or interest on investment."

The breeds of horses, C. G. WRANGEL (*Die Rassen des Pferdes. Stuttgart, 1909, vol. 2, pp. VII+456, pl. 1, figs. 81*).—A treatise on the origin, history, and characteristics of the different breeds of horses throughout the world. Volume 1 of this work has been previously noted (E. S. R., 20, p. 75).

The thoroughbred horse as a product of systematic selection, A. VON WEINBERG (*Ber. Senckenb. Naturf. Gesell., 42 (1911), No. 2, pp. 145–174, figs. 24*).—A study of the pedigrees of some foundation thoroughbred stock.

A study of the Arab horse in northern Africa, F. VATIN (*Étude sur le Cheval Arabe dans le Nord de l'Afrique. Commercy, 1909, pp. XI+38, pls. 21*).—A popular account of the Arab horse in Morocco, Algeria, Tunis, Tripoli, and Egypt.

The Anglo-Norman horse, G. RAU (*Arb. Deut. Landw. Gesell., 1910, No. 170, pp. IX+124, pls. 15*).—A history of this breed and its adaptability to Germany. The pedigrees of the principal stallions now in service in Germany are appended.

The most important breeding lines of the Rhenish "cold bloods," J. FRIZEN (*Arb. Deut. Gesell. Züchtungsk., 1911, No. 9, pp. 69, tables 12, pls. 42*).—A short history of the breeding of heavy horses in Rhenish Prussia, with pedigrees of some of the important breeding stock.

Studies on the function of adaptation and anatomical and physiological differences between the so-called "warm" and "cold-blooded" horses, M. MÜLLER (*Fühling's Landw. Ztg., 60 (1911), No. 16, pp. 545–562*).—Measurements were made of light and heavy horses and the internal organs were weighed after slaughtering.

The lung capacity of light horses, as determined by inflation, was less than that of heavy horses, but in proportion to the weight of the animal was relatively greater, and, as in earlier work (E. S. R., 22, p. 776), the author does not agree with the findings of Lutzow (E. S. R., 21, p. 571). The lung tissue was of finer structure and of greater elasticity in the light horses. The capacity of the heart, as determined by Von Bohr's method, and the average weight of the liver, spleen, and the amount of blood were also relatively but not absolutely greater than in heavy horses. The actual hemoglobin content of the blood was higher in light than in heavy horses.

It is concluded that the thoracic organs of the light horse as a whole have a relatively greater function of capacity. There is a discussion of the significance of the angle of the different bones in the fore and hind limbs of different types of horses.

Investigations on the relation between the cranial cavity, lung capacity, and the thoracic cavity, K. MOLTHOF (*Untersuchungen an Pferden über das Verhältnis der Kophöhlen- zur Lungenkapazität und Bemerkungen über die letztere im Verhältnis zum Brustraum. Inaug. Diss., Univ. Bern, 1910, pp. 31*).—From measurements of 36 horses of different types the author concludes that there is a correlation between the small head, small cranial capacity, and large lung capacity. This is more pronounced in oriental types. There is no correlation between lung capacity and weight of the lung. References to further work on the subject are cited.

Italian breeds of poultry, M. GUARDASONI (*Indus. Latt. e Zootec., 9 (1911), No. 13, pp. 203, 204; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, p. 1728*).—The Leghorn and Val d'Arno breeds of fowl are described.

Egg-laying competitions, 1910–11, D. F. LAURIE (*Dept. Agr. So. Aust., Egg-Laying Competitions, 1910–11, pp. 36*).—This is the official report, giving full details as to the method of feeding and the egg production of the competing flocks.

Size inheritance in ducks, J. C. PHILLIPS (*Jour. Expt. Zool., 12 (1912), No. 3, pp. 369–380*).—A preliminary report of crosses between French Rouen ducks and the common domestic Mallard duck. In the F_1 generation inheritance of size was intermediate between both parents, with very little variation; in the F_2 generation there was an increased variability.

The utilization of bird feathers in France, MÉNÉGAUX and CONTENT (*Agr. Com. [Paris], 8 (1911), No. 12, p. 296; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 7, p. 1729*).—Statistical information on the trade in feathers of both wild and domesticated birds is given.

Treatise on histology.—General and special cytology. Histology and microscopic anatomy, A. PRENANT, P. BOUIN, and L. MAILLARD (*Traité D'Histologie. Paris, 1904, vol. 1, Cytologie Générale et Spéciale, pp. XXXII+977, figs. 791; 1911, vol. 2, Histologie et Anatomie Microscopique, pp. XL+1199, figs. 572*).—In volume 1 of this work the principal topics discussed are the nature of protoplasm and cell structure, embryonic cells and tissue, cells for special purposes, cell division, reproduction of the individual, oogenesis, spermatogenesis, fertilization, and theories of heredity.

Volume 2 treats of embryology, and the histology of embryonic and mature tissues of all organs in the animal body.

Recent progress in some lines of cytology, M. F. GUYER (*Trans. Amer. Micros. Soc., 30 (1911), No. 2, pp. 145–190*).—A review of recent investigations on the chemistry of the cell, the colloidal nature of protoplasm, the permeability of cell membranes, dynamics of cell division, relation between chromosomes and heredity, the accessory chromosome, and the determination of sex. There are many citations to the literature on these topics.

Protozoan germ plasm, G. N. CALKINS (*Pop. Sci. Mo., 79 (1911), No. 6, pp. 568–580, figs. 13*).—It is pointed out that there is a specific germ plasm and somatic plasm with natural death in unicellular animals, and that therefore Weismann's hypothesis that there is a fundamental difference between unicellular and multicellular animals is not wholly true.

On a possible source of the biological individuality of the tissues and tissue fluids of animal species, T. B. ROBERTSON (*Univ. Cal. Pubs., Physiol., 4 (1911), No. 5, pp. 25–30*).—It is pointed out that the individual constituents and relative proportion of protein complexes afford an intelligible explanation of the individuality of the tissues and tissue fluids. See also previous notes by Abderhalden and Funk (E. S. R., 23, p. 702) and Graetz (E. S. R., 25, p. 702).

Anatomy and histology of the male reproductive organs of birds, A. TRAWINSKI (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., Ser. B, 1910, Nos. 7, p. 720; 8, pp. 721–727, pls. 2; 1911, No. 2, pp. 76–84, pl. 1*).—The anatomy of the reproductive organs of the drake, gander, swan, teal (anas querquebale) are illustrated and described.

Some experiments in fertilization and incubation of hens' eggs (*Geflügel-Welt, 3 (1911), No. 27, p. 207; abs. in Internat. Inst. Agr. [Rome], Bul. Bur.*

Agr. Intel. and Plant Diseases, 2 (1911), No. 7, pp. 1727, 1728).—In experiments with an Italian cock and Italian and Wyandotte hens, eggs laid 6 days after mating were infertile. The fresher the eggs the more reliable were the results of incubation. The hatching quality was affected by the season. Eggs once heated by the incubator required some time to cool. The heating of 3 incubators, each containing 200 eggs, was interrupted for 24 hours, leaving the eggs at the temperature of the room in which they were placed, without causing injury to the chicks.

The effect of spermatoxin on the female organism and the ovum, M. P. TUSCHNOW (*Uchen. Zap. Kazan. Vet. Inst., 28 (1911), Nos. 1, pp. 1–83; 2, pp. 103–204; abs. in Zentbl. Allg. u. Expt. Biol., 2 (1911), No. 13–15, p. 360*).—In experiments with rabbits, dogs, and sheep the inoculation of the female with living spermatozoa prevented pregnancy. It is thought that a substance toxic to the sperm was formed in the blood.

Can the spermatozoon develop outside the egg? J. LOEB and F. W. BANCROFT (*Jour. Expt. Zool., 12 (1912), No. 3, pp. 381–386, pls. 2*).—In experiments with the fowl the sperm was removed aseptically and kept in a sterilized, moist chamber at about 39° C., but was always used soon after its removal from the animal, not later than 3 hours after it was taken out. Cultures were made on media containing egg yolk, egg albumin, blood serum, and other substances. It was found that in the yolk and the white of egg the spermatozoon underwent transformation into a nucleus, though mitosis or asterformation was not observed.

On the isolation of oocytase, the fertilizing and cytolyzing substance in mammalian blood sera, T. B. ROBERTSON (*Univ. Cal. Pubs., Physiol., 4 (1912), No. 11, pp. 95–102*).—A fertilizing substance was obtained from the blood serum of an ox which was capable of causing eggs of sea urchins to form a fertilizing membrane. This fertilizing agent, which appears to be derived from the breaking down of corpuscles in shed blood, is thermostabile, resisting an exposure of 19 hours to a temperature of 58°, and being analogous to the cytases observed by Metchnikoff and others. It is therefore named oocytase.

Investigations on uric acid production and the nucleoproteid formation in chick embryo, L. S. FRIDERICIA (*Skand. Arch. Physiol., 26 (1912), No. 1–3, pp. 1–120, figs. 4*).—A historical résumé of investigations on the metabolism of the incubating egg, together with the author's recent analytical work on protein metabolism.

A small amount of uric acid was found in the allantoic fluid and extremities of the embryo, which was produced from the tenth day until the last day of incubation. From the fourteenth to the seventeenth day the amount was in proportion to the weight of the embryo. Only very small amounts of purin bases were found in infertile and unincubated eggs, but during incubation they were produced from the eleventh to the seventeenth day, and in proportion to the weight of the embryo.

A bibliography is appended.

On the interchange of the limbs of the chick by transplantation, FLORENCE PEEBLES (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 20 (1910), No. 1, pp. 14–18, figs. 3*).—It was found possible to develop chick embryos in porcelain cups in a moist chamber up to the ninth day. The leg bud when removed was successfully grafted on the proximal part of the wing and the wing bud on the proximal portion of the leg without permanently injuring the embryo. The grafted part became a part of the appendage to which it was attached instead of retaining

the character of the part it was destined to become. No regeneration of the limbs took place after removal of the buds.

Light thrown by the experimental study of heredity upon the factors and methods of evolution, C. B. DAVENPORT (*Amer. Nat., 46 (1912), No. 543, pp. 129–138*).—The new views of looking at problems of heredity and the origin of differential characters of organisms are discussed. One cause of sterility in rumpless fowls is explained.

Problems of evolution and present methods of attacking them, E. G. CONKLIN (*Amer. Nat., 46 (1912), No. 543, pp. 121–128*).—A discussion of the merits of the experimental method, and the possible causes of the origin of new characters. It is pointed out that it has not yet been proved that the determination of unit characters is beyond the reach of environmental influences.

Further remarks on the law of ancestral heredity, K. PEARSON (*Biometrika, 8 (1911), No. 1–2, pp. 239–243*).—The applications of this law are illustrated by mathematical formulas. It is pointed out that the theory of multiple correlations is the natural one in which to approach the theory of ancestral inheritance, and that there is no regression whatever on Galton's hypothesis after the first generation, at which selection is stopped.

Biotypes and phylogeny, H. L. CLARK (*Amer. Nat., 46 (1912), No. 543, pp. 139–150*).—A discussion of the relation of pure strains (biotypes) to the phylogenetic problems which concern the systematist.

An alleged specific instance of the transmission of acquired characters.—Investigation and criticism, T. G. BROWN (*Proc. Roy. Soc. [London], Ser. B, 84 (1912), No. B 575, pp. 555–579, figs. 3*).—A report of experiments in producing the Brown-Séquard phenomenon in guinea pigs.

The author finds that the phenomenon is not an acquired peculiarity produced de novo on division of the great sciatic nerve, but is due to the raised excitability of a mechanism already present when the inhibiting influence is removed by sectioning the nerve. The phenomenon, therefore, can not be considered as transmissible as an acquirement per se. If anything is transmitted as an acquired character it must be the state of raised excitability of the scratch-reflex.

The presence of the phenomenon may be admitted, but this may be explained as due to a production of the state by injury to the toes and feet inflicted by the parent, and is therefore not a case of transmission of acquired characteristics.

On the origin of a pink-eyed guinea pig with colored coat, W. E. CASTLE (*Science, n. ser., 35 (1912), No. 900, pp. 508–510*).—In the course of an attempt to reduce the amount of pigment by systematic selection the author has obtained a guinea pig closely resembling an albino, but with spots of blue on the right side of its head and on the hips. Apparently it represents a long step in the modification of a race by artificial selection, in which the color factor or factors become so modified as to give an extreme case of dilution.

Another case of sex-limited heredity in poultry, C. B. DAVENPORT (*Proc. Soc. Expt. Biol. and Med., 9 (1911), No. 2, pp. 19, 20*).—In reciprocal crosses of dark Brahmas and brown Leghorns the males were white-laced, but the wing bar was red in the male offspring. This was not the case with the pullets, as they always inherited the lacing of the male parent. The hybrids have been bred together and produced a second generation. When a hybrid male was mated to a white-laced hybrid female all the offspring were white-laced, while half the pullets were white-laced and half red-laced. With the reciprocal cross, half of the male offspring were white-laced and half red-laced, while half of the pullets were white-laced and half red-laced, as in the reciprocal mating.

DAIRY FARMING—DAIRYING.

The feeding of dairy cattle, H. ISAACHSEN (*Tidsskr. Norske Landbr., 18 (1911), No. 9, pp. 385–398*).—A discussion of the economics of feeding dairy cattle, with special reference to conditions in the northern districts of Norway. Profitable dairying, in the author's opinion, here depends largely on home-grown feeds, especially roots, and in the use of the domestic supply of fish scraps for protein food to a larger extent than heretofore.

Feeding experiments with dairy cows, K. HOFMANN and J. HANSEN (*Landw. Jahrb., 40 (1911), Ergänzungsb. 1, pp. 129–190, 306–344*).—The feeds tested were oil cakes, legumes, by-products of fermentation industries, and potatoes in various forms.

Maize slop, linseed meal, cotton-seed meal, and legumes, especially vetches and peas, were added to the list formerly reported, as exerting a specific effect by increasing the amount of fat in the milk (E. S. R., 21, p. 174). The remainder of the feeds tested were found to exert no specific effect.

False flax (*Camelina sativa*) was considered a poor dairy feed. Maize slop, vetch, peas, and beans were better feeds than barley, while rye slop and malt sprouts were inferior to barley. Rape cake gave better results than peanut cake or hemp cake, but sunflower cake was inferior to all these cakes. Soy beans were considered a good feed when given in moderate amounts. Potato chips, potato flakes, and raw potatoes had about equal feeding values. No advantage was found in soaking the chips before feeding.

The effect of diminishing the rations of dairy cows, U. CLAUSS (*Mitt. Landw. Inst. Leipzig, 1911, No. 10, pp. 165–224*).—The author found that decreasing the amount of digestible nutrients in rations decreased the yield of milk but not the percentage of fat. The feeds used were meadow hay, barley straw, wheat bran, molasses, coconut cake, and peanut cake. Analyses of the feeds are given.

On the feeding value of sesame cake for milch cows, N. HANSSON (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 48, pp. 30; K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 8, pp. 673–700; Fuhling's Landw. Ztg., 61 (1912), No. 8, pp. 265–274*).—In feeding trials with 3 herds, comprising 60 cows in all, sesame cake was contrasted with peanut-cake meal, peas, and vetches. It decreased the fat content of the milk but increased the yield, so that the amount of milk fat remained about the same. The weights of the cows were not appreciably affected by the changes in feed. Because the sesame cake affected the quality of the milk, it is recommended that not over 1 or 1½ kg. be given per cow per day.

Report of division of dairy husbandry, J. C. MCNUTT (*North Carolina Sta. Rpt. 1911, p. 33*).—Four heifers under 10 months of age appeared unthrifty and either made no gain or lost in weight during 2 months in which cotton-seed meal constituted a part of the ration. Two other heifers over 10 months old made normal gains on the same ration. A control lot of 6 heifers, averaging from 5 to 10 months old, which received no cotton-seed meal, also made satisfactory gains. A young bull calf was fed on cotton-seed meal mixed with skim milk, 4 oz. of the meal per day being supplied at the start and the amount being gradually increased until he received 1.5 lbs. per day. The calf died after being on this feed 71 days.

"The results seem conclusive that cotton-seed meal should not be fed to calves under 10 months of age."

Testing different breeds of cattle, K. HOFMANN and J. HANSEN (*Landw. Jahrb., 40 (1911), Ergänzungsb. 1, pp. 210–305, 345–430, pls. 14*).—This is a continuation of earlier work (E. S. R., 21, p. 173). It contains measurements of

cattle, and data as to the yields and composition of milk. The results are summarized in the following table:

Average milk yields of German breeds.

Breed.	Live weight.	Annual yield of milk.	Fat content.	Total solids content.	Breed.	Live weight.	Annual yield of milk.	Fat content.	Total solids content.
	Kg.	*Kg.*	*P. ct.*	*P. ct.*		*Kg.*	*Kg.*	*P. ct.*	*P. ct.*
Angler	443	5,222	3.51	12.51	Red Holstein	602	5,685	3.27	12.07
Jeverländ	563	6,725	3.09	11.86	Wesermarsch	570	5,423	3.24	11.85
East Prussian Holland [a]	599	7,238	3.05	11.54	Schwyz	567	5,150	3.60	12.76
East Friesian [a]	591	6,674	3.09	11.80	Simmental	659	5,565	4.05	13.27
Lower Rhine	547	5,880	3.31	12.12	Westerwäld	323	2,678	3.79	12.99
Breitenburg	551	5,999	3.36	12.34	Glan	418	2,760	4.16	13.57

[a] First lactation.

West Siberian dairying, with special reference to the dairy associations, W. von Borowski (*Mitt. Landw. Inst. Leipzig, 1911, No. 10, pp. 89–163*).—A general and statistical article on the dairy industry in western Siberia, to which are appended a bibliography and analytical data on milk and butter in Siberian dairies.

The growth of some milk bacteria at different temperatures, W. B. Luxwolda (*Centbl. Bakt. [etc.], 2. Abt., 31 (1911), No. 5–10, pp. 129–175*).—A study of the optimum and range of temperatures of *Streptococcus acidi lactici*, *Bacillus coli communis*, *B. fluorescens liquefaciens*, *B. subtilis*, *B. proteus*, and *Staphylococcus pyogenes albus*.

Milk kept at low temperatures for a long time was found to contain an astonishing number of bacteria without becoming acid because of the growth of the psychro-tolerant nonacid producing types, but the changes in milk were more harmful than if the acid forms were prevalent. At 20° C. lactic forms were much stronger and had a restraining influence on all other types, but this restraining influence was very much diminished at 15°, and still more so at 10°, when *B. fluorescens liquefaciens* and other species became quite numerous. At from 3 to 5° very few types of bacteria grew except the last-named species.

A bibliography on the subject is appended.

The fermenting capacity of the single cells of Bacterium lactis acidi, O. Rahn (*Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 13–19, pp. 375–406, fig. 1*).—This has been previously noted from another source (E. S. R., 26, p. 708).

Tubercle bacilli and uncooked food (*Vt. Bd. Health Bul., 12 (1912), No. 3, pp. 58–60*).—Samples of market butter obtained from different creameries were examined for tubercle bacilli by guinea pig inoculation. Tubercle bacilli were found in 3 samples, while 2 samples gave negative results. Pathological conditions were produced by inoculations of 5 other samples, but the cause of the lesions was not determined.

Ropy milk, J. Golding (*Jour. Bd. Agr. [London], 18 (1912), No. 12, pp. 991–1005, pl. 1*).—A résumé of investigations of bacteria which were the cause of ropy milk. A bibliography is appended.

Investigations on the composition of milk and cheese prepared from the same, Laskowsky (*Milchw. Zentbl., 7 (1911), No. 12, pp. 545–576*).—This consists largely of tabulated data of the chemical composition of milk and the following varieties of cheese: Cream, Camembert, Romadour, Limburg, Tilsit fat, Tilsit half-fat, and Tilsit one-third fat.

The protein content of milk was found to vary more than the fat content. There seemed to be no correlation between the protein content of the milk and that of the cheese. In Limburg and Romadour there seemed to be a slight correlation between the fat content of the milk and that of the cheese, whereas in Camembert there was a correlation between the fat content of the cheese and that of the whey, but not between the fat content of the cheese and of the milk. There was a correlation between the fat content of milk and the half-fat Tilsit cheese, but not when whole milk was used in the manufacture of this variety.

The relation of the acid rennet (acidoproteolytic) bacteria of cheese to lower temperatures, and their effect on the ripening of cheese, C. GORINI (*Centbl. Bakt. [etc.], 2. Abt., 32 (1912), No. 13–19, pp. 406–411; Rev. Gén. Lait, 9 (1912), No. 5, pp. 97–102*).—In continuation of earlier work (E. S. R., 25, p. 582) the author finds that *Micrococcus acido protcolyticus* I and II and *Bacillus casei proteolyticus*, developed in cheese kept at low temperatures (under 10° C.), assisted in the process of ripening, and that the enzyms formed by these organisms may effect changes at 5° and even lower temperatures.

The bacterial flora of "gomolya," O. GRATZ and L. RÁCZ (*Kisérlet. Közlem., 14 (1911), No. 6, pp. 912–925*).—The most common types of bacteria found in the curd of sheep's milk (known as gomolya), from which Hungarian Brinse cheese is made, were *Bacterium lactis acidi*, *B. casei*, and *Micrococcus acido proteolyticus* I and II. Other organisms often present, but in smaller numbers, were tyrothrix, *Actinomyces odorifera*, *Oïdium lactis*, nonsporing forms of casein-digesting bacteria, and other yeasts and bacteria.

VETERINARY MEDICINE.

Report of the veterinary director general and live stock commissioner, J. G. RUTHERFORD ET AL. (*Rpt. Vet. Dir. Gen. Canada, 1911, pp. 391, pls. 9*).—In the main part of this report (pp. 3–94) the author discusses the work of the year ended March 31, 1911.

Appendix 8 (pp. 123–135) consists of the report of the pathologist, C. H. Higgins. Investigations in regard to hog cholera are summarized as follows: "Hog cholera is caused by an ultra-microscopic virus capable of passing the finest porcelain filters. This confirms again the original statements of Dorset, McBryde, and subsequent investigators. Contact with infective material seems to be very nearly as potent in inducing infection as direct inoculation. An in-contact-immune hog does not necessarily carry infection in its system for an extended period. No opinion can be offered indicating a relationship between human typhoid and hog cholera from our experiments." Tuberculosis and enterohepatitis are also considered.

Appendix 9 (pp. 136–144), which consists of a report of the first assistant pathologist, S. Hadwen, deals with investigations of hematuria or hemorrhagic cystitis, a disease occurring among cattle in British Columbia, and the cause of which is still uncertain. This disease is said to be confined entirely to bench lands having an elevation of from 100 to 300 ft. above sea level.

In appendixes 10, 11, and 12 the second assistant pathologist, A. Watson, discusses investigations relating principally to dourine, its diagnosis, pathogenicity, and a practical test of the efficacy of drug treatment with especial reference to the action of atoxyl and arsenophenylglycin.

Appendix 13 (pp. 157–177) consists of a report of investigations of swamp fever of horses, by J. L. Todd and S. B. Wolbach. Among the other subjects presented in the 23 appendixes are the text of the animal contagious diseases act and the regulations relating to animals' quarantine, the text of the meat and canned food's act, as amended in 1910, report of the International Commission on Bovine Tuberculosis, etc.

Report of the government veterinary bacteriologist for the year 1909–10. A. THEILER (*Rpt. Govt. Vet. Bact. Union So. Africa, 1909–10, pp. 174, pls. 30*).—This report contains the following papers: The Artificial Transmission of East Coast Fever, by A. Theiler (pp. 7–55); Notes on the Nature of Koch's Granules and Their Rôle in the Pathogenesis of East Coast Fever, by K. F. Meyer (pp. 56–68); The Development of *Theileria parva*, the Cause of East Coast Fever of Cattle in South Africa, by R. Gonder (pp. 69–83) (E. S. R., 25, p. 285); Stiff-Sickness or Stijfziekte in Cattle, by A. Theiler (pp. 84–94) (E. S. R., 25, p. 88); Notes on *Crotalaria burkeana* and other Leguminous Plants, by J. Burtt-Davy (pp. 95–103) (E. S. R., 25, p. 282); *Anaplasma marginale*, by H. Sieber (pp. 104–116); Notes on the Chemotherapeutic Treatment of Biliary Fever in Dogs, by K. F. Meyer (pp. 117–150); Notes on the Treatment of Canine Piroplasmosis with Trypanblue, by J. B. Botelho (pp. 151–155); On the Sero Diagnosis of Glanders, by K. F. Meyer (pp. 156–169) (E. S. R., 25, p. 684); and Preliminary Communication on the Fixing of Complement in Horse Sickness and East Coast Fever, by G. Lichtenheld (pp. 170–174).

First report of the director of veterinary research (*Rpt. Dir. Vet. Research, Union So. Africa, 1 (1911), pp. 275, pls. 21, figs. 2*).—In addition to the report on Further Investigations into Anaplasmosis of South African Cattle, previously noted (E. S. R., 26, p. 584), the following papers are presented: Progress Report on the Possibility of Vaccinating Cattle against East Coast Fever (pp. 47–207); Some Observations Concerning the Transmission of East Coast Fever by Ticks (pp. 208–222), by A. Theiler; The Development of *Theileria parva*, the Cause of East Coast Fever of Cattle in South Africa, II (pp. 223–228), by R. Gonder (E. S. R., 25, p. 285); The Transmission of Amakebe by Means of *Rhipicephalus appendiculatus*, the Brown Tick (pp. 229–231), by A. Theiler (E. S. R., 25, p. 882); The Culicidæ or Mosquitoes of the Transvaal (pp. 232–272), by F. V. Theobald; and An Infectious Foot Disease in Sheep (pp. 273–275), by A. Theiler (E. S. R., 26, p. 383).

A practicum of bacteriology and protozoology (*Praktikum der Bakteriologie und Protozoologie. Jena, 1909, 2. ed. enl., pt. 1, pp. VI+111, figs. 40; 1910, pt. 2, pp. VI+106, figs. 76*).—A second enlarged edition of this work (E. S. R., 19, p. 982). The first part, by K. Kisskalt, deals with bacteriology; the second, by M. Hartmann, deals with protozoology.

Pharmaceutical bacteriology, A. SCHNEIDER (*Philadelphia, 1912, pp. VIII+238, figs. 86*).—Following a brief introduction and history, the subject is taken up as follows: General morphology and physiology of bacteria; range and distribution of bacteria; bacteriological technique; bacteria in the industries; immunity, bacterial activities, and bacterial products; the manufacture and use of sera and vaccines; yeasts and molds; protozoa in disease; disinfectants and disinfection—food preservatives—insecticides; sterilization and disinfection in the pharmacy; communicable diseases, with suggestions on preventive medicine; and a bacteriological and microscopical laboratory for the pharmacist.

Veterinary calendar for the year 1911, edited by RAUTENBERG (*Veterinär-Kalender für das Jahr 1911. Berlin, 1911, 1. Abt., pp. XII+495, pl. 1*).—This is a pocket vade-mecum.

Parasitology of domestic animals, M. NEVEU-LEMAIRE (*Parasitologie des Animaux Domestiques: Maladies Parasitaires non Bactériennes. Paris, 1912, pp. II+1257, figs. 770*).—This work, which deals with the parasites of domestic animals other than the bacteria, is divided into 2 parts; the first taking up the vegetable parasites (pp. 15–182), the second the animal parasites (pp. 183–1129). A host list of parasites of mammals, birds, and insects (honeybee and silkworm), arranged according to the parts of the animal attacked, is appended (pp. 1130–1179), together with a short bibliography.

Some blood parasites (Hæmoproteus and Hæmogregarina), S. T. DARLING (*Bul. Soc. Path. Exot., 5 (1912), No. 2, pp. 71–73*).—The author deals with the occurrence of *Hæmoproteus danilewski* and 5 other parasites of the turkey buzzard; a hemogregarine, resembling *Hæmogregarina muris* and *Hepatozoon perniciosum*, and 6 other parasites of *Mus norvegicus;* a hemogregarine of iguanas, *Iguana tuberculata;* several other hemogregarines of the reptiles; and a hemogregarine of *Bufo marinus*, for which the tick *Amblyomma varium* apparently acts as an intermediate host.

The rôle of the infective granule in certain protozoal diseases, A. BALFOUR (*Brit. Med. Jour., 1911, No. 2654, pp. 1268, 1269*).—A further consideration of this subject (E. S. R., 25, p. 881).

Investigations in regard to the germicidal properties of leucocytes, E. WEIL (*Arch. Hyg., 74 (1911), No. 7–8, pp. 289–344*).—The results are given of an examination of the behavior against leucocytes of 10 saprophytic organisms obtained partly from the air in rooms and partly from drinking water.

Ascaris poisoning, R. GOLDSCHMIDT (*München Med. Wchnschr., 57 (1910), No. 38, pp. 1991–1993; abs. in Vet. Rec., 24 (1911), No. 1219, pp. 308, 309*).—A general discussion with references to the literature. The author calls attention to the striking resemblance of the symptoms of ascaris poisoning to those of hay fever.

The etiology of infectious abortion in live stock, E. S. GOOD (*Amer. Vet. Rev., 40 (1912), No. 4, pp. 473–484*).—A paper presented by the author at the forty-eighth annual convention of the American Veterinary Medical Association, at Toronto, Canada, in August, 1911.

An undescribed organism, pathogenic to laboratory animals, cattle, and sheep, and simulating black quarter, in its pathogenicity, F. S. H. BALDREY (*Jour. Trop. Vet. Sci., 6 (1911), No. 3, pp. 283–291, pls. 3, figs. 5*).—The morphology, cultural characteristics, and pathogenicity of this organism are dealt with.

Comparative bacteriological and serological studies in regard to symptomatic anthrax and pseudo-blackleg, W. N. MARKOFF (*Centbl. Bakt. [etc.], 1. Abt., Orig., 60 (1911), No. 3–4, pp. 188–222*).—The author concludes that the disease known as birth blackleg is caused by a series of, but different, anærobes, and is therefore not a specific condition. It can occur as a result of a typical symptomatic anthrax or as a typical malignant edema infection. At times it may appear as one of the varieties of malignant edema. A differential diagnosis can not be made with certainty on the basis of a microscopic examination. Cultural and serological methods are much better.

Anthrax, W. B. MACK (*Nevada Sta. Circ. 13, p. 11*).—This is a popular account, dealing with the occurrence and nature of the disease, its prevention, and remedial measures.

A "milk" outbreak of diphtheria suggestive of bovine origin, W. ROBERTSON (*Pub. Health [London], 25 (1912), No. 4, pp. 148, 149*).—An outbreak of diphtheria in which 9 consecutive cases occurred in 8 days is thought to be traceable to a bovine source. Examinations made of scrapings taken from an ulcer on the udder of a cow showed that a majority of the organisms present were staphylococci with a few streptococci, but bacilli which exhibited the cultural and microscopical characteristics of the Klebs-Loeffler bacillus were also found to be present.

The transmission of gall sickness by ticks, A. THIELER (*Agr. Jour. Union So. Africa, 3 (1912), No. 2, pp. 173–181, figs. 2*).—The data here presented are included in an account previously noted (E. S. R., 26, p. 173).

Diagnosis of glanders with the ophthalmo reaction, R. REINHARDT (*Monatsh. Prakt. Tierheilk., 23 (1912), No. 4–5, pp. 178–197*).—The ophthalmo reaction is

deemed the simplest and most convenient method for diagnosing glanders in a large number of animals, and is very certain. Occult cases can be easily detected by this method. In this work a comparative study was made between the ophthalmo, cutaneous, subcutaneous, precipitation, agglutination, and complement fixation methods.

Reduction of virulence in a strain of Trypanosoma hippicum selected from a guinea pig, S. T. DARLING (*Bul. Soc. Path. Exot., 5 (1912), No. 3, pp. 184–187*).—"A strain of *T. hippicum* that had survived in a guinea pig the exceptionally long period of 336 days showed upon subinoculation on the two hundred and seventy-ninth and three hundred and thirty-sixth day very feeble pathogenic powers when compared with all other strains, and with the same strain at an earlier period of the infection in the guinea pig.

"The reduction of the virulence was temporary, for after residence in a mule its virulence for mice, rat, and guinea pig was regained."

Experimental infection of the mule with Trypanosoma hippicum by means of Musca domestica, S. T. DARLING (*Jour. Expt. Med., 15 (1912), No. 4, pp. 365, 366*).—A brief account of this work has been previously noted (E. S. R., 26, p. 656).

Investigation of viruses obtained from cases of human tuberculosis other than lupus, A. S. GRIFFITH (*Roy. Com. Tuberculosis, Final Rpt., II, App., 1 (1911), p. 543, pls. 7, figs. 29*).—This volume records the results of investigating new cases of human tuberculosis other than lupus, and includes a full account of the cultural and pathogenic properties of the 2 types of tubercle bacilli isolated from them and of experiments to ascertain whether any of the properties of these bacilli could be altered by residence in the bodies of mammals or birds.

Tabular summaries are given of inoculation experiments performed on different species of animals, together with full post-mortem notes of the larger animals grouped together according to the virus used. A series of photographs illustrating the types of growth of the cultures is appended. Pictorial charts exhibiting the lesions produced in calves, pigs, and goats by viruses obtained from cases of human tuberculosis other than lupus are included with other similar charts in a supplementary volume.

Investigations of viruses obtained from cases of lupus, A. S. GRIFFITH (*Roy. Com. Tuberculosis, Final Rpt., II, App., 2 (1911), p. 485, pls. 2, figs. 22*).—This is a study of the cultural characters and pathogenicity (ordinary virulence for calves, rabbits, rhesus monkeys, guinea-pigs, and other species of animals) of the cultures isolated from cases of lupus vulgarus in man.

Reports on investigations dealing with certain human viruses of irregular type, the excretion of tubercle bacilli in the milk of animals, swine tuberculosis, and immunity, A. S. and F. GRIFFITH ET AL. (*Roy. Com. Tuberculosis, Final Rpt., II, App., 3 (1911), p. 355, pls. 2, fig. 38*).—This volume gives the results of 4 investigations.

"The material used in the investigations with swine were obtained from 63 cases of tuberculosis occurring naturally in swine; in 21 of these the disease was apparently localized to the lymphatic glands (submaxillary and mesenteric) of the alimentary tract from which the material used for investigation was taken; in 33 the disease was generalized; in the remaining 9 the condition of the rest of the body could not be ascertained with certainty. In every animal in the series with two exceptions the disease appeared to be alimentary in origin. . . .

"Natural tuberculosis in swine may be the result of infection either with the bovine tubercle bacillus, the human tubercle bacillus, or the avian tubercle bacillus.

"The bovine tubercle bacillus is the most common cause of tuberculosis in swine, and has been found in every case in this series where there was disseminated tuberculosis, as well as in more than half (10 out of 18) of those in which, so far as could be ascertained, the disease was localized.

"The tuberculous lesions in the pig's lymphatic glands caused by the human tubercle bacillus or the avian tubercle bacillus can not be distinguished from the lesions sometimes produced by the bovine tubercle bacillus."

The results of the immunity experiments "clearly show that by the inoculation of large doses of living human tubercle bacilli, as well as by the inoculation of small doses of bovine tubercle bacilli, the resistance of a calf can be raised sufficiently to protect it against the inoculation of a dose of bovine tubercle bacilli which has been shown to be capable of setting up severe and fatal tuberculosis in a calf not so protected. They show further that this degree of resistance is not always produced, and that calves which have been vaccinated once, and even twice, with slightly virulent human bacilli may develop fatal tuberculosis when inoculated with virulent bovine bacilli."

Results of the tests in regard to the excretion of tubercle bacilli in the milk of animals have been noted elsewhere (E. S. R., 26, p. 777). Reports submitted to the Commission in 1906 on the stability of Tubercle Bacilli in the Living Animal and on Experiments with Mixed Viruses, by L. Cobbet, are also included.

Investigations into the tuberculosis occurring naturally in certain animals other than man, and modification experiments, F. GRIFFITH (*Roy. Com. Tuberculosis, Final Rpt., II, App., 4 (1911), pp. 451, pls. 3*).—This report gives the results of 5 investigations, which were as follows: Tubercle bacilli derived from 5 cases of tuberculosis occurring naturally in the horse; viruses obtained from casual tuberculosis of various mammals (gnu, antelope, rhesus monkey, chimpanzee, and cat); avian tubercle bacilli obtained from birds and swine (9 avian sources, 3 fowls, 3 pheasants, a pigeon, a demoiselle crane, and a Senegal touracou); modification experiments with tubercle bacilli derived from animals other than man (bovine and avian); and artificially mixed cultures with calves and rabbits.

In the first investigation the cultures from 3 viruses, E I, E III, and E V, corresponded exactly in their behavior on artificial media and in their high virulence for rabbits and guinea pigs to those cultures isolated from bovines. Two of the 3 viruses E I and E III which were inoculated subcutaneously into calves and pigs produced a lethal generalized tuberculosis, such as follows the introduction of bovine tubercle bacilli. The remaining 2 cultures, E II and E IV, behaved more like the human type of bacillus in calves and other animals.

"The virulence of 3 of the equine viruses was tested on horses. The culture of virus E I inoculated intravenously in a dose of 10 mg. caused fatal tuberculosis in 17 days. The horses inoculated intravenously with equivalent doses of viruses E II and E IV died of general tuberculosis in 40 and 98 days, respectively. The culture of virus E II did not cause progressive tuberculosis after subcutaneous inoculation. A horse inoculated subcutaneously with virus E IV was killed when very ill after 125 days and had general tuberculosis. The experiments on horses with bovine tubercle bacilli [did] not result in the production of progressive tuberculosis after either subcutaneous inoculation or feeding with moderately large doses, but by the intravenous inoculation of 10 mg. acute tuberculosis was set up fatal in 20 days."

The results of the second investigation show that a gnu and an antelope, "belonging to the order of ruminants, had acquired casually severe tuberculosis due to infection with tubercle bacilli, which experimentally had only slight virulence for calves and could not be distinguished culturally from human

tubercle bacilli. Cultures of slight virulence for rabbits, with the cultural characters of [certain] human tubercle bacilli, [were] obtained from a chimpanzee and from a rhesus monkey, also the subjects of casual tuberculosis. The chimpanzee acquired the disease by ingestion, the post-mortem examination showing several ulcers in the small intestine and enlargement and caseation of the mesenteric glands. The immediate cause of death was acute miliary tuberculosis of the lungs. The rhesus monkey had chronic pulmonary tuberculosis and slight disseminated disease. From the mesenteric gland of a cat affected with casual tuberculosis a culture was isolated which grew with difficulty on the various differential media, resembling a bovine tubercle bacillus. It was fully virulent for rabbits and guinea pigs, and not virulent for the fowl."

From the investigations on avian tubercle bacilli obtained from birds and swine no constant or important differences were observed either in the cultural characters or in the pathogenic properties of the organisms isolated and examined.

From the modification experiments which were conducted with birds and various mammals it is concluded that little support can be given "to the surmise that modification of the recognized types of bacilli can be experimentally induced by passage through animals. In the majority of the numerous experiments in which cultures of mammalian and of avian tubercle bacilli have been obtained after residence of the bacilli of experiment in a single animal or after passage through a series of animals no change whatever has occurred either in cultural characters or virulence. It has happened in a few instances that cultures differing widely from those inoculated have been obtained from one or other animals, but where these occurrences are not clearly referable to complication by natural tuberculosis they are so exceptional that the presumption is against modification of the bacilli having been effected."

The results of the work with the artificially mixed cultures show "that if a calf is inoculated subcutaneously with a mixture of a slightly virulent culture and a virulent culture, it is possible to recover from the lesions produced cultures in which the virulent element can alone be demonstrated, even though in the original mixture the slightly virulent bacilli were in preponderating numbers. This elimination is demonstrable when, as in this case, there is a wide difference between the cultural characters of the two cultures. A similar result can be obtained, though less quickly, by means of the subcutaneous inoculation of rabbits."

Comparative histological and bacteriological investigations, A. EASTWOOD (*Roy. Com. Tuberculosis, Final Rpt., II, App., 5 (1911), pp. 344, pls. 16*).—This is the continuation and final report of the work reported in the appendix to the second interim report of the Royal Commission on Tuberculosis (E. S. R., 19, p. 984).

When comparing tubercle bacilli of known human origin with those obtained from other mammalia having spontaneous disease, it was noted that in every case the bacilli from other than human origin were identical culturally, microscopically, and in their effects upon the tissue of the experimental animals with the bacilli obtained from certain cases of tuberculosis in man.

With reference to the anatomical origin of the human viruses investigated, attention is called to the fact that in every part of the human body tubercle bacilli were found which were culturally and in their histological effects identical in every respect to the tubercle bacilli usually found in the bodies of tuberculous swine and cattle. On the other hand, many bacteria were noted which grew with more luxuriance and produced much less tissue destruction in the organs of certain experimental animals than those bacilli which came from tuberculous cattle and swine.

In addition, intermediate viruses were noted which could not be classified into one or the other of 2 fixed types. As there was an essential unity of characteristics present in all the mammalian viruses examined, it is believed that the differences observed were differences of degree and not of kind; that is, such differences as luxuriance of growth and intensity of tissue changes. When mammalian and avian viruses were compared, however, there were noted differences not only of degree but of kind. The growth of the avian bacillus could be differentiated without any trouble from the mammalian bacillus by the nature of its growth.

"The animals yielding cultures for the bacteriological work and the tissues for the histological investigations were bovines, rabbits, rhesus monkeys, chimpanzees, baboons, lemurs, swine, guinea pigs, goats, dogs, cats, rats, mice, horses, fowls and parrots."

The newer staining methods, I, S. ROSENBLAT (*Centbl. Bakt. [etc.], 1. Abt., Orig., 58 (1911), No. 2, pp. 173–192*).—The author concludes that a combination of 2 stainings according to Zeihl's and Gram's procedure gives a better picture in regard to the finer structure of the tubercle bacillus than the preparations obtained by either the Much or Gasis method.

Investigations in regard to bovine tuberculosis, NIEBERLE (*Ztschr. Fleisch u. Milchhyg., 21 (1911), Nos. 11, pp. 339–352; 12, pp. 380–389, pls. 2; 22 (1911), No. 1, pp. 12–21*).—This is a report of an extensive investigation of bovine tuberculosis which has special reference to meat hygiene. The article considers particularly softened tuberculous areas and the tuberculous bronchiopneumonic processes. The article is illustrated with photomicrographs of pathological preparations.

Tuberculosis of the central nervous system of bovines, S. HJORTLUND (*Ztschr. Fleisch u. Milchhgy., 22 (1911), No. 1, pp. 5–12*).—Tuberculosis was found to occur quite frequently in the central nervous system of animals. Although infection of this part of the organism was in most instances accompanied by a generalized infection, cases were noted where the central nervous system was the only part infected. These atypical cases were always noted in the younger animals.

A contribution to the study of the alimentary intoxications of the horse, E. MOUILLERON (*Rec. Méd. Vét., 88 (1911), No. 19, pp. 607–616; abs. in Amer. Vet. Rev., 40 (1912), No. 5, pp. 557–561*).—This paper reports upon an intoxication of horses that was caused by feeding beans (*Phaseolus lunatus*) from Java and Peru, the daily ration consisting of oats 3½ kg., corn 4 kg., beans ½ kg., peat molasses 2 kg., and cut straw 3 kg.

Three forms of the disease are described: (1) A benign form characterized by anorexia; (2) a more grave form, which is not fatal, localized in the alimentary canal with complications of laminitis; and (3) the true intoxication, with nervous symptoms, which nearly always proves fatal. Chemical analyses made of the beans show the presence of phaseolunatin, a hydrocyanic acid-yielding glucosid which under the influence of emulsin is, in the presence of water, decomposed into glucose, hydrocyanic acid, and acetone, the hydrocyanic acid being the cause of the toxic manifestations. As high as 102 mg. of hydrocyanic acid per 100 gm. of the beans was found present.

On the occurrence of two species of parasites in equine piroplasmosis or biliary fever, G. H. F. NUTTALL and C. STRICKLAND (*Parasitology, 5 (1912), No. 1, pp. 65–96, pls. 2, figs. 14*).—"The term 'biliary fever' or 'piroplasmosis' hitherto supposed to apply to a specific disease affecting horses, in reality refers to 2 distinct diseases produced by distinct parasites. For convenience sake, and in accordance with the terminology at present in vogue, these 2 diseases

may be named after the parasites which produce them, i. e., piroplasmosis (due to *Piroplasma* [or *Babesia*] *caballi* Nuttall, 1910) and nuttalliosis (due to *Nuttallia equi* Laveran, 1910, Franca, 1909)."

A further contribution on the diagnosis of pernicious anemia of the horse. E. ABDERHALDEN and W. BUCHAL (*Arch. Wiss. u. Prakt. Tierheilk., 37 (1911), No. 3, pp. 309–313*).—This is a continuation of the investigation previously noted (E. S. R., 24, p. 392). The authors' studies led them to consider the determination of the inhibitory power of serum an important aid in the recognition of pernicious anemia of the horse.

On the inhibition of saponin by the blood (serum and erythrocytes) of horses suffering from pernicious anemia and from glanders, E. ABDERHALDEN and A. WEIL (*Arch. Wiss. u. Prakt. Tierheilk., 38 (1912), No. 3, pp. 243–245*).—Continuing the investigations above noted, the authors find the inhibitory power of the blood of animals suffering from pernicious anemia to be very great when compared with that of animals affected by glanders or septicemia, and to exceed that of any disease of the horse thus far met with.

"Aphis foot" of horses in the Tamworth district, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 22 (1911), No. 9, pp. 789–791, figs. 2*).—The author finds that aphis foot, a disease that appears at irregular intervals during the summer when grass and lucern are growing most luxuriantly, is due to a mite closely allied to *Symbiotes communis equi*, the form that causes foot mange in horses in the United States. "The name aphis foot has been given to this infestation by the local farmers because, at the time when it first appears, the common green aphis is abundant upon the lucern."

"I can find no reference in any reports on these mites in America to the remarkable fact that the white legs and white patches on the animals are always the first parts infested by these mites in Australia; and it is also evident that the foot mange of the horse in the United States, if identical with aphis foot is not such a serious infestation as it is in Australia."

Report of the veterinary department, R. A. CRAIG (*Indiana Sta. Rpt. 1911, pp. 49, 50*).—During the year ended July 30, 1911, 1,262,296 cc. of antihog cholera serum, or sufficient to vaccinate 31,557 hogs, was produced by the department. "One hundred and fifty hyperimmune hogs were used in the production of this serum. During the year 79 hyperimmunes were given a final bleeding and killed; 57 hogs were hyperimmunized, and 14 hogs died from the injections of virulent blood and injuries received in handling them. Twenty-three bleedings were the greatest number for any one hyperimmune. This hog was used for serum production 7 months and produced during that time 34,860 cc. It received injections of virulent blood amounting to 18,900 cc. The intraperitoneal method of producing a hyperimmune hog was used, but it was discarded because of the unsatisfactory results following its use."

In the herds from which complete reports of the results were received, there was an average loss of 2.25 per cent in the vaccinated herds, and 9.5 per cent in the treated herds.

The work is said to have shown that when 3,000 cc. of a virulent normal salt solution are injected into the abdominal cavity of a virulent blood hog weighing 100 lbs. it is not of sufficient virulence to produce potent serum. Smaller injections or about 20 cc. of normal salt solution per pound of body weight have proved more virulent and may be considered one-half as valuable as cholera blood in the production of the hyperimmune.

Feeding experiments with Tilletia. A contribution to the hygiene of nutrition, A. SCHEUNERT and E. LÖTSCH (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 9 (1911), No. 3–4, pp. 177–187*).—Experiments conducted in which swine of various ages received large quantities of smutty food (*Tilletia laevis* and *T. tritici* (*caries*) gave negative results in that no ill effect was observed.

Treatment of canine piroplasmosis by arsenobenzol, C. LEVADITI and L. NATTAN-LARRIER (*Bul. Soc. Path. Exot., 4 (1911), No. 5, pp. 291–296*).—Experiments with 3 dogs show that dioxydiamidoarsenobenzol (Salvarsan) is an efficient remedy when administered at any stage of this disease of dogs. A single dose of 40 mg. per kilogram weight of the animal is said to be sufficient. Tests made with one of the cured dogs showed that it had acquired a partial immunity, being resistant to a dose of virus which in 48 hours caused the death of a check animal of the same age and weight.

[Acidifying] air and rice bacteria the cause of polyneuritis gallinarum, J. H. F. KOHLBRUGGE (*K. Akad. Wetensch. Amsterdam, Proc. Sect. Sci., 13 (1911), pt. 2, pp. 904–916*).—The author describes a new bacterium which he found to acidify wet sterilized rice within a few hours after the rice was exposed to the air. It is described as a "small, short rod, having great resemblance to the coli bacillus of the intestines."

This bacillus acidifies neutral sterilized rice within 24 hours; in its absence the rice always remains neutral. Dry grains of rice sown on sterilized neutral rice all proved to be a source of acid in which this bacillus was found. When unhusked rice grains were passed through a gas flame several times, charring the coarse yellow skin and the white one beneath it, and leaving only the interior part of the grain white, it was found that on grinding rice treated in this way in a sterilized mortar and inoculating on neutral sterilized rice that the acidifying bacillus still developed.

The author states that in his attempt to work with pure cultures he has often been hindered by a certain lengthened rod that made its appearance in the cultures. Both bacilli were found in every portion of acidified rice and in every dry rice grain, and "both make rice sour; it seems, consequently, that they live as in symbiosis, or support each other."

A series of experiments was carried on from which it appeared (1) that the obligate intestine bacteria do not acidify rice, (2) that the air-bacterium that acidifies rice can be shown in the crop and intestines of chickens that died from polyneuritis gallinarum, and (3) that in acute cases of polyneuritis the air bacterium can almost supersede the intestine bacteria. "It was soon shown that these bacilli, and even entire cultures together, injected into the breast muscles and into the peritoneum do not cause polyneuritis gallinarum.

Chickens fed with sterilized rice and cultures of acidifying rice bacilli grown on ferment showed even on the third day symptoms of paralysis and cyanosis. "The third day they are sitting in the cage with paralyzed feet and bristling feathers, blue combs, soon show dyspnoe, and die the fifth day. A dreadful diarrhea was perceptible previously and the animals are enormously emaciated in those five days, so that even the breast muscles have disappeared. All symptoms correspond entirely to those which chickens, fed with rice only, do not show before the twenty-fourth or twenty-fifth day, but here they coincide in a short space.

"This experiment proved undubitably that the air and rice bacillus generating sour fermentation, isolated by me, can cause the symptoms of polyneuritis gallinarum when it is introduced into the intestines of chickens."

Observations concerning the pathology of roup and chicken pox, C. M. HARING and C. A. KOFOID (*Amer. Vet. Rev., 40 (1912), No. 6, pp. 717–728*).—The conclusions drawn from the studies here presented are as follows:

"There is good evidence to believe that nasal roup (Schleimhauterkrankungen) and chicken pox, or epithelioma contagiosum (Geflügelpocke) are 2 distinct diseases. Immunity to chicken pox does not confer immunity to roup, nor vice versa. Diphtheritic lesions in the mouth and throat of fowls may be produced

by either roup, chicken pox, or mechanical injury, followed by mixed infection of various organisms. In diphtheritic lesions due to chicken pox a microscopic examination shows the presence of the characteristic cell inclusions of epithelioma contagiosum. Epidemics have been observed in which the fowls were affected with both chicken pox and roup at the same time.

"Lesions similar to roup and diphtheria produced by mechanical injury or by infection with pyogenic bacteria can not be transmitted by association. Blood of diseased fowls, when injected intravenously, produces chicken pox. The blood of fowls affected with chicken pox has the property of complement fixation to a greater extent than the blood of normal fowls."

The occurrence of Cheilospirura hamulosa in the United States, B. H. RANSOM (*Science, n. ser., 35 (1912), No. 901, p. 555*).—The occurrence in the United States of *C. hamulosa*, a nematode parasitic in the gizzard of the chicken, is recorded for the first time. The collection of the Bureau of Animal Industry of this Department contains specimens collected in Kansas, New Jersey, District of Columbia, Ohio, Indiana, and Hawaii.

Attempts to transmit "fowl pest" by Argas persicus, E. HINDLE (*Bul. Soc. Path. Exot., 5 (1912), No. 3, pp. 165–167*).—"The results have been sufficiently definite to show that although Argas is unable to transmit 'fowl pest' yet the virus of the disease remains alive in the gut of the tick for a period of about 9 days. The virus, however, is not able to traverse the wall of the gut, and therefore neither the cœlomic fluid nor any other part of the tick except the contents of the alimentary canal become infected."

RURAL ENGINEERING.

The state administration of public highways in the United States (*Engin. News, 67 (1912), No. 13, pp. 595–598*).—This article describes the highway administration in the various States. It is stated that of the 48 States, 26 have passed laws providing for some sort of financial state aid for road construction, 6 States for advisory and experimental bodies, and the remaining 16 States have done little or nothing to promote good roads, except to furnish occasionally convict labor.

Good roads and how to build them, L. W. PAGE (*Sci. Amer., 106 (1912), No. 11, pp. 236–238, figs. 8*).—In this article are pointed out the general need of more systematic road maintenance and administration, the economic importance of studying and utilizing local material, and the essential features in the improved construction of sand-clay, gravel, and macadam roads.

Bituminous roads and pavements and their materials of construction. F. HUBBARD (*Jour. Franklin Inst., 173 (1912), No. 4, pp. 343–363*).—This is a paper presented at the meeting of the Mechanical and Engineering Section of the Franklin Institute, held February 29, 1912, which discusses bituminous earth, gravel, and macadam roads, and bituminous concrete, sheet asphalt, asphalt block and bituminous wood block pavements, and the methods of preparing the bitumen for application in each of the above cases.

[Material and construction of highway bridges and culverts], J. N. EDY (*Amer. Thresherman, 14 (1912), Nos. 9, pp. 56–58; 10, pp. 28, 29; 11, p. 84; 12, p. 48; 15 (1912), No. 1, pp. 36–38, figs. 13; Farm and Home [Mass.], 33 (1912), No. 694, pp. 320, 321, figs. 4*).—The author points out the faulty features of the average highway bridge and culvert construction and of the use of wood as a material, and suggests wherein lie the improvements that will remedy these features. He dwells on the importance of having the work planned and executed by some one familiar with the requirements of location, material, design,

and construction, and discusses the important features of the design and construction of wood, concrete, and steel bridges and culverts.

Roads and road materials of Alabama, W. F. PROUTY (*Geol. Survey Ala. Bul. 11, 1911, pp. 148, table 1, pls. 20, figs. 2*).—This report gives the history of roads in Alabama, the character and distribution of road-building material in the State, results of tests by the Office of Public Roads of this Department on rock samples, and papers by state and county officials discussing construction of macadam, gravel, chert, sand-clay and earth roads, dustless roads and bituminous binders, location and drainage of roads, and the use of wide tires on vehicles.

The road-building materials in the State are distributed in 3 general areas, viz, the crystalline area in the east-central portion in which occur the "traps," granites, syenites, gneisses, and schists; the paleozoic area in the north and northeastern portions in which occur cherts, limestones, gravels, clays, shales, and sands; and the coastal plain area in the south and western portions in which occur gravels, sands, clays, and calcium carbonates.

Appendixes to this report include tables to be used in the construction of roads and testing of materials, and a table of the road mileage and road cost data in each county. Accompanying the report is a map of Alabama showing the distribution of road material throughout the State.

Biennial report of the highway commissioner [of Connecticut], 1907–8, J. H. MACDONALD (*Bien. Rpt. Highway Comr. Conn., 1907–8, pp. 285+90, pls. 21, figs. 6*).—This report covers road construction, improvement, and maintenance in Connecticut, 1907–8, gives the total mileage and cost in each county, describes the character of the work in each county, the contracts, and general road administration, and presents standard state road specifications and state road laws. Accompanying this report is the state road map of Connecticut.

Report of the Illinois Highway Commission, 1908–9, A. N. JOHNSON, T. R. AGG, and C. OLDER (*Rpt. Ill. Highway Com., 3 (1908–9), pp. 156, pls. 29, figs. 14*).—In this report are chapters on earth road construction, various kinds of macadam road construction, and the design and construction of steel and concrete highway bridges in Illinois in 1908–9, with data on costs and amounts spent on roads and bridges in the State, approximating $6,000,000 per year. Included in this report is a report from the attorney general's office containing various opinions on road matters.

Sixth annual report of the commissioner of highways for the State of Maine, 1910, P. D. SARGENT (*Ann. Rpt. Comr. Highways Me., 6 (1910), pp. 157, pls. 11, figs. 6*).—This report covers the road administration and the contracts, petitions, methods, and costs for road improvement and construction in Maine in 1910. Tabular statements of the state road work are given by towns and counties, including data on total length and width, drainage, method and materials of construction, and costs.

Report of the commissioner of public roads [in New Jersey], 1910, F. GILKYSON (*Ann. Rpt. Comr. Pub. Roads [N. J.], 17 (1910), pp. 177, pls. 19*).—This report covers the road construction and improvement in New Jersey in 1910, giving the methods of construction and repair and the total mileage and cost in each county. The roads for the most part were built or repaired by macadamizing or surfacing with gravel.

Appendixes to this report are standard state specifications for stone and gravel roads, a copy of the state road improvement law, and tables indicating the number of tons of stone per mile required to build roads of designated width and depth. Accompanying this report is the state road map.

Surplus products of counties—Good roads and drainage (*Missouri Red Book, 1911, pts. 2–4, pp. VI+283–560, pls. 19, figs. 14*).—This publication gives a large amount of statistical data on the surplus products of Missouri in 1910,

discusses the conditions, the construction, maintenance, cost, and administration of roads, and the scope of drainage works and investigations in the State.

Neighborhood irrigating systems, J. W. SWAREN (*Town and Country Jour., 28 (1912), No. 19, pp. 4, 5, figs. 3*).—This article discusses the relative advantages and disadvantages of the corporation canal system, the individual pumping system, and the neighborhood cooperative pumping system of irrigation. A comparison of cost advantages and disadvantages indicates that the system of cooperative pumping is the cheapest and most advantageous.

Savage irrigation in Luzon, H. WRIGHT (*Sci. Amer., 106 (1912), No. 5, p. 108, figs. 4*).—This article describes the irrigation of rice terraces as practiced by the Ifugaos of Luzon. These are works of considerable magnitude, and some of the terraces show remarkable engineering. The works show progress in the art of irrigation as they irrigate and fertilize in one operation.

The Laramie-Poudre tunnel, B. G. COY (*Proc. Amer. Soc. Civ. Engin., 38 (1912), No. 3, pp. 217–230, pls. 6, figs. 2*).—This paper discusses the location, construction, cost, and method of operation of an irrigation tunnel in Colorado, which diverts a part of the waters of the Laramie River and tributaries into the Cache la Poudre River, thereby reenforcing the supply of the latter river for irrigation purposes in case of shortage. This tunnel is of nearly rectangular cross-section, 7½ ft. high by 9½ ft. wide, has a grade of 1.7 per cent and a capacity of 800 cu. ft. per second, and is 11,306 ft. long.

Report of the State Board of Irrigation of Nebraska, 1909–10, E. C. SIMMONS (*Bien. Rpt. Bd. Irrig. Nebr., 8 (1909–10), pp. 207, fig. 1*).—This report covers the irrigation administration in Nebraska in 1909–10, reporting action on claims and applications for water and a large amount of data from measurements of the principal streams of the State. Accompanying this report are a list of recommendations by the irrigation board for the revision of the State irrigation laws, and a list of miscellaneous water measurements with convenient equivalents.

Second biennial report of the territorial engineer of New Mexico, 1909–10, V. L. SULLIVAN (*Bien. Rpt. Ter. Engin. N. Mex., 2 (1909–10), pp. 188+67, figs. 61*).—This report covers the operation of the Carey Act in New Mexico, the district irrigation laws, proposed irrigation and power projects, the scope of irrigation and power development work, and reports on the Hondo and Rayado hydrographic surveys, the methods and cost of road construction, and water supply records of the principal streams of the State.

Fourth biennial report of the state engineer of North Dakota, 1909–10, T. R. ATKINSON (*Bien. Rpt. State Engin. N. Dak., 4 (1909–10), pp. 110*).—This report gives the scope of irrigation and drainage in North Dakota in 1909–10, including data from the hydrographic investigations of the principal streams.

Irrigation and drainage, L. A. B. WADE (*Rpt. Dept. Public Works N. S. Wales, 1909, pp. 56–67; 1910, pp. 55–83*).—This portion of the reports deals with the progress of irrigation and drainage improvements in New South Wales in 1909–10, gives the details of the construction of works on different streams and drainage areas, and discusses the methods of preliminary investigations, surveys, and estimates for proposed undertakings.

Methods of tile draining gumbo, hardpan, and seepy land in Kansas (*Engin. and Contract., 37 (1912), No. 13, pp. 355–357*).—This is an abstract from a paper read before the Kansas Engineering Society, by H. B. Walker of the Kansas State Agricultural College. It discusses the methods by which the soils in Kansas may be tile drained, and gives general directions for making and mapping surveys and estimating costs.

Drainage reclamation in Tennessee, G. H. Ashley, A. E. Morgan, and S. H. McCrory (*Tenn. Geol. Survey Bul. 3, 1910, pp. 74, pl. 1*).—This bulletin deals with drainage reclamation in Tennessee under 3 headings: The first, Drainage Problems in Tennessee, discusses the meteorology, geography, need of drainage, and drainage possibilities of the State; the second is a preliminary report on the Drainage of Lands Overflowed in Gibson County, giving information and data on the precipitation and run-off in the county and the details of surveys; and the third is a copy of the state drainage law of Tennessee.

German development of the hydraulic ram, R. P. Skinner (*Daily Cons. and Trade Rpts. [U. S.], 15 (1912), No. 78, pp. 22, 23*).—This article calls attention to the methods and cost of operation of a new phase of the hydraulic ram called the hydropulsor, by means of which it is claimed that the flowing and ebbing of the tide or the flowing of rivers of very small fall can be utilized as a means of pumping for land drainage, generating energy, and raising water in locks.

Agricultural electricity, A. Petit (*Électricité Agricole. Paris, 1909, pp. 424, figs. 81*).—This publication deals with the uses of, and the methods of generating and using, electricity on the farm. It discusses the production of electric energy by means of water and wind power and steam and internal combustion engines, the transmission of electric energy, use of electric energy on the farm by transforming it into mechanical energy, heat for lighting, cooking, etc., and chemical energy for electro-chemical use; explains the physiological effects of the electric current as a precaution against accidents and for electroculture, and the care and maintenance of electrical installations; and describes existing examples of installations on farms.

The gas pump (*Agr. Jour. Union So. Africa, 3 (1912), No. 2, pp. 237–239, fig. 1*).—This article describes the operation of a gas-driven pump suitable for lift irrigation.

This pump is extremely simple in construction and operation, the explosive force acting directly on the water so that no fly wheel, crank shaft, solid piston, connecting rod, or bearings are required. The movement of the water in the pump draws in fresh water, exhausts burnt products, draws in a fresh combustible charge, and compresses the charge previous to ignition. It thus makes a complete cycle of operations as in an ordinary gas engine, except that the expansion of burnt products is carried to atmospheric pressure, when the exhaust valve opens and expansion continues below atmospheric pressure, forcing the water into the suction box, compressing the new charge of gas, and starting a new cycle of operation. The ignition is timed by a small apparatus which closes an ignition circuit of batteries, coil, and spark plug at the point of maximum compression.

Mechanical plowing, C. Costantini (*Bol. Quind. Soc. Agr. Ital., 17 (1912), No. 5, pp. 127–131, figs. 4*).—This article outlines the methods of operation of a system of mechanical plowing and gives data on the cost of operation. The system consists essentially of a motor attached to 2 windlass cars which pull a balanced plow back and forth across the field.

Tests of machinery for vine cultivation (*Arb. Deut. Landw. Gesell., 1912, No. 201, pp. 120, pls. 3, figs. 165*).—This work describes and gives the methods and results of tests and examinations of a number of various implements and other apparatus to be used in vine cultivation, including horse implements for cultivating the ground, spraying apparatus and machinery, fumigation apparatus and machinery, and trellises.

An automatic motor-driven vine cultivator, P. de la Bathie (*Rev. Vit., 37 (1912), No. 950, pp. 261–264, figs. 3*).—The mechanical details and operation of a machine for summer cultivation of vines are described in this article.

The machine consists essentially of a metallic frame mounted on 3 wheels, supporting a 4½-horsepower fan-cooled motor in front, a fuel tank on top, and below 3 small triangular plows on one axle, and 4 small rake teeth on another axle. The motor action causes the rake teeth to oscillate as the machine proceeds. The 2 large drive wheels are in front, and the third wheel is a small guide wheel set behind, which also regulates the depth of cultivation.

Practical barn plans and all kinds of farm buildings, W. A. RADFORD (*Chicago and New York, 1911, pp. 169, figs. 336*).—In this publication are found plans showing the methods of design and the structural details of farm buildings, and also a description and discussion of each building and its construction. The buildings are classified as dairy barns, general farm barns, horse barns, cattle sheds and feed lots, poultry houses, miscellaneous buildings, and dwelling houses. In addition to these is a discussion of the construction and use of minor "farm helps."

Portable hog fence (*Nor'-West Farmer, 31 (1912), No. 7, p. 471, fig. 1*).—A portable wooden hog fence is described which is made in 12 ft. panels 2 ft. 10 in. high, consisting of 4-in. uprights, 4-in. braces, and 4 sideboards, of 6, 5, 4, and 3 in. The 5- and 4-in. boards are extended and attached to a 26½-in. locking piece which locks into a 22-in. opening in the next panel, forming a splice that is said to be hog tight.

RURAL ECONOMICS.

The cause of high prices, T. E. BURTON (*Sci. Amer. Sup., 73 (1912), No. 1886, pp. 126–128*).—While showing that high prices as a rule are due to an increased standard of living, which always necessitates an increase in prices unless there is equal progress in production, this article discusses the many factors contributing to the constant rise in the standard. To show that there has not been equal progress in production, it is stated that science working through inventions and improved methods has not accomplished the same results in agriculture as in manufacturing, and that revolutions in industrial methods and in the utilization of capital on large scale operations have not been accompanied by equal progress on the farm. Attention is called to the fact that prices of raw material have increased much more than prices of the manufactured product.

As a solution of the high cost of living problem it is suggested that there should be an entire revolution in the methods of distribution, substituting great warehouses for small scattered shops through which the consumer and producer may be brought nearer together.

Cooperation and cost of living in certain foreign countries (*U. S. House Representatives 62. Cong., 2. Session, Doc. 617, pp. 248*).—A document containing a special message from the President of the United States transmitting data on cooperation and the cost of living in the United Kingdom, as collected and collated from inquiries instituted by the Department of State through its consular officers. The President considers the information "a permanent contribution to the history of the efforts of producers and consumers to solve for themselves the economic problems of production, distribution, and consumption." It is significantly stated that while advances in wages have been made in many places, the percentage has not kept pace with the rise in the cost of food supplies.

Cooperative enterprises of the Farmers' Union, A. C. DAVIS (*Texarkana, Tex., [1912], pp. 25*).—A pamphlet giving the name and organization of the various cooperative enterprises of the Farmers' Union in the United States, and the kind of articles handled. The enterprises are classed as Farmers' Union

warehouses, gins, grain elevators, clearing houses, banks, creameries, mines, stores, and miscellaneous.

The advantage of consolidating smaller concerns is illustrated by the Mississippi plan, where the parent company owns and operates 60 branches in different sections of the State. During the season 1909–10 the company handled 50,000 bales of cotton, most of which was sold direct to the consumer, both in America and Europe. The trade in fertilizers alone, which are sold to the membership upon contract direct with the manufacturers, amounted to over $300,000.

[Cooperative stores in the Northwest] (*Co-operation [Minneapolis], 4 (1912), No. 4, pp. 142–155*).—Financial statements of 28 cooperative stores in the northwest section of the United States are here submitted, showing the distribution of assets and liabilities of each, the total capital, surplus, rate of gain, dividends, etc.

Splendid record of cooperation, W. H. Ingling (*Amer. Agr., 89 (1912), No. 12, pp. 437, 449*).—An address before the New York State Agricultural Society in which are pointed out the causes of the formation of the Monmouth County Farmers' Exchange of New Jersey, what methods the association has followed, and what results have been attained. The exchange was organized in 1908, with a capital of $7,000 and a membership of 350. The first year's business amounted to $454,414, and the records for 1909 show a capital stock of $74,245; a surplus of $16,831, with undivided profits of $7,612, after a dividend of 5 per cent had been paid; and a membership of 1,045.

Agricultural societies and cooperative credit banking, D. T. Jones (*Co-operation [Minneapolis], 4 (1912), No. 3, pp. 89–91*).—The material progress of the cooperative movement in Great Britain is here noted. The sales of the wholesale societies, as reported by the central board of the cooperative congress, increased from about $70,000,000 in 1895 to over $171,000,000 in 1910; the sales from the retail societies from $170,000,000 to $359,000,000, the profits being $54,691,655. The sales of the agricultural society amounted to $20,196,790 during 1909, an increase of 214 per cent over sales for 1899.

It is significantly stated that the movement has enabled one-half of the country's population to succeed, through cooperation in production and distribution, in reducing the cost of living at least 15 per cent.

Statistics of agricultural cooperative credit societies in England and Wales (*Bd. Agr. and Fisheries [London], Leaflet 260, pp. 8*).—This leaflet presents notes and statistics of agricultural cooperative societies in England and Wales, but deals only with societies which confine their operations to the granting of loans to small farmers. At the end of 1910 there were in England and Wales 40 such societies, 31 of which, according to the annual returns, had a membership of 663 and had made 119 loans aggregating £1,390 during the year. The rate of interest charged ranged from 4 to 6 per cent.

An outline of the European cooperative credit system (*Internat. Inst., Agr. [Rome], Pamphlet, 1912, Feb. 26, pp. 62*).—This pamphlet presents information concerning the organization and work of the Raiffeisen and Schultze-Delitzsch banks and other systems of cooperative credit for agricultural purposes in various countries.

The total business done by one of the above named banks in Germany alone in 1909 was 6,537,075,959 marks ($1,557,293,580), while the total business done by the other in 1910 was 13,566,182,463 marks.

Observations on European agriculture, G. S. Fraps (*Texas Sta. Bul. 143, pp. 5–35, figs. 16*).—This bulletin presents a description of some observations on European agriculture made by the author on a trip through Scotland, England, France, Switzerland, Germany, Denmark, Holland, and Belgium in 1911.

Among the several observations noted, it is stated that European countries differ from American in 2 important particulars, which influence agricultural practice—the high value of land, and the comparative low wage paid the European laborer. It is further noted that European farms are maintained at a higher degree of fertility, tenants not being permitted to rob the land of its plant food. Leases prescribe methods which shall maintain soil fertility, and the tenant is liable for any depreciation. Dairy, stock, and grain farming are extensively practiced. Cooperative marketing of farm products, as in Denmark, is commended.

The new agriculture of Japan, J. ALVIN (*Country Gent., 77 (1912), No. 13, pp. 5, 6*).—This article discusses the agricultural awakening in Japan, quoting from an address by Dr. Inazo Nitobe how its peasants produce enough from 14,000,000 acres to feed and clothe 50,000,000 people, besides furnishing silk for clothing millions of others. The awakening is attributed to the intensive methods of farming and proper use of fertilizers; the cooperative movement among farmers which enables them to borrow money at 10 per cent interest where formerly they paid 20 or 30 per cent; the aid given by the semiofficial agricultural banks in the way of loans to any one desiring to clear and break new land, the loans being for a long term and at a low rate of interest; and the educational system, which requires instruction in agriculture in all schools from the kindergarten to the university.

The average farm contains 2½ acres, yet 70 per cent of them are smaller than this. The rural population consists of about 30,000,000 persons, 73 per cent of whom own more or less land.

Economic movement in Canada, P. LEROY-BEAULIEU (*Écon. Franç., 40 (1912), I, No. 12, pp. 421, 422*).—A discussion of general economic conditions as applied to agriculture in Canada, showing the movement of population from the country to cities and from one section of country to another, and the economic causes and consequences of such changes. It is noted that while there has been a marked increase in the production of wheat, there is a relative stagnation in the production of other crops.

Statistical data are submitted as to production and exportation of a number of crops, including live stock, dairy products, etc.

[Immigrants from United States to Canada] (*Country Gent., 77 (1912), No. 10, p. 1*).—Attention is called to the fact that of the 400,000 new settlers in Canada in 1911, 130,000, or 32.5 per cent, went from United States. The prime cause of this is said to be the greater liberality of Canada's homestead law, which provides that any citizen, or one who has declared his intention to become such, may acquire title to 160 acres of land by residing upon it not less than 6 months each year for a period of 3 years. The homestead law of the United States requires a continuous residence period of 5 years.

Observations upon government assistance to agriculture in certain countries of Europe, H. S. ARKELL (*Canada Dept. Agr., Branch Live Stock Comr. Bul. 15, 1911, pp. 15*).—This paper briefly summarizes data as to the methods followed by government agencies in aiding agriculture in Ireland, France, Belgium, and Denmark, with special reference to horse breeding.

Sales for agricultural purposes bill (*Rpt. Select Com. House Lords [Gt. Brit.], Sales Agr. Purposes Bill, 1912, pp. XVIII+183*).—This is the report of the Select Committee of the House of Lords to inquire into the provisions of the bill regulating sales of commodities for agricultural purposes, together with the proceedings of the committee and minutes of evidence.

Farm accounting an aid to better farming, E. H. THOMSON (*N. Y. Tribune Farmer, 11 (1912), No. 540, pp. 1, 2, fig. 1*).—This article presents a few general principles, together with illustrations, which are deemed of service to the indi-

vidual farmer in keeping a record of farm enterprises. These records or accounts are said to aid materially the economic management of the farm (1) by determining the cost of production, and so helping to fix the selling price at a more profitable point; (2) by showing a man his exact financial standing, so that he can determine whether or not he is making a profit; and (3) by bringing forcibly to his attention many of the details of the business, which are easily overlooked.

Theories of farm management, E. Laur (*Fühling's Landw. Ztg., 61 (1912), No. 1, pp. 1–7*).—This is a theoretical discussion of several economic factors entering into the management of farms both collectively and as units. Illustrations as to the amount of capital entering into various farm operations are given, together with a discussion of systems of agricultural credit as they are operated in Germany.

The choosing of a farm (*World's Work, 23 (1912), No. 5, pp. 597, 598*).—Among the factors to be considered in the selection of a farm, the following are discussed and illustrated: The property itself, the environment, the community, the farm as a manufacturing plant, its commercial relations with markets and sources of supplies, and the farm as a home.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 14 (1912), No. 3, pp. 17–24, fig. 1*).—The quantity of wheat, corn, oats, and barley on farms March 1 is reported as 1,320,842,000 bu. against 1,804,246,000 bu. at the same time in 1911, and 1,565,859,000 bu. in 1910. Corresponding data are given for each crop by States. Other statistics show the average wages of farm labor from 1866 to 1911; world crop production; monthly range of price of contract wheat at Chicago, and an average farm price on the first of each month from 1908 to 1911 inclusive; cost of producing oranges in California; wealth of the United States and value of farm land and improvements; farm value of important products on dates indicated; range of prices of agricultural products at important markets; production of sugar in various countries, 1906–7 to 1910–11; comparative crop report for Florida from 1908 to 1912; stocks of wheat in interior mills and elevators; monthly receipts and stocks of eggs; exports of domestic cotton from the United States, 1908–1911 by countries of destination; production of important crops in the leading 5 States, 1909–1911; and other data.

Agricultural statistics (*Internat. Inst. Agr. [Rome], Bul. Agr. Statis., 3 (1912), No. 1, pp. 3–8*).—Notes and statistics as to area and production of cereal crops in the Southern and Northern hemispheres, by countries, are here presented.

AGRICULTURAL EDUCATION.

Henry Hill Goodell, C. Stebbins (*Cambridge, Mass., 1911, pp. VIII+340, pl. 1*).—A biographical sketch of the former president of the Massachusetts Agricultural College, together with selections from his letters, addresses, and other papers. Considerable data regarding the early history of the college are included.

New England's advance, C. S. Phelps (*Country Gent., 76 (1911), No. 3070, pp. 22, 23*).—Attention is called to the influence of fairs, fruit shows, and corn expositions in bringing about a greater interest in New England agriculture and to the success achieved in farming by young men trained in agricultural colleges. It is stated that during the past 2 years a large proportion of the prize winners at both fruit shows and corn shows in Massachusetts "have been men trained in agricultural colleges who have returned to their home farms and are putting their knowledge into practice."

The present status of agricultural education in public secondary schools of the United States, C. H. ROBISON (*School Rev., 19 (1911), No. 5, pp. 333–344*).—This investigation calls attention to the fact that whereas in 1906–07 there were only about 15 public secondary schools having an agricultural course of 2 or more years, and these mostly of the special sort, there are now over 30 high schools or academies depending on local support or patronage and distributed among 15 States; at least 46 schools receiving State aid for their agricultural departments, but offering general high-school courses and found mostly in 5 States; and between 45 and 50 strictly agricultural secondary schools, existing apart from the agricultural colleges and more or less independent of them.

The number of weeks devoted to agriculture in 171 schools offering it for one year or less varied from 6 to 40, with a strong central tendency at 18, the number of weeks in 82 schools. Eighty-one schools reported the subject as required and 63 reported it as elective.

Out of 136 schools 29 reported no science preliminary to agriculture, 70 reported 1, 26 reported 2, and 11 reported 3 sciences. It was preceded by physical geography 72 times, by botany 33 times, by physiology 17 times, by physics 16 times, by chemistry 6 times, and by others 11 times.

Over 100 schools reported doing practically all the experiments in the text or manual used. Half as many carried on additional experiments while about the same number reported "a few" experiments, no laboratory work, or ignored the question.

A brief history of elementary education, ANNA E. SOUTHARD (*Ohio Ed. Mo., 61 (1912), No. 1, p. 20–25*).—This is a brief history of the growth of agricultural education in this country, beginning with the year 1747 and closing with the Ohio law requiring elementary and high-school teachers to pass an examination in agriculture on and after September 1, 1912.

Agricultural education in the public schools, B. M. DAVIS (*Chicago, 1912, pp. VII+163*).—In this volume have been brought together the articles previously noted as appearing in the *Elementary School Teacher*. As a whole the volume reviews the work of the following agencies and their contributions to the promotion of agricultural education: The U. S. Department of Agriculture, U. S. Bureau of Education, state departments of education and state legislation, the agricultural colleges, the state normal schools, the National Education Association and other teachers' associations, educational periodicals, periodical literature, state organizations for agriculture—farmers' institutes, agricultural societies, boys' agricultural clubs, elementary and secondary schools, and textbooks. In assembling these articles for publication in book form the author has revised them to include the latest available information, in many cases bringing the data up to 1912.

An annotated bibliography of 202 references is included. There is also an introduction by C. H. Judd, director of the School of Education, University of Chicago.

What and how in agriculture for women teachers, J. R. CLARKE (*Ohio Teacher, 32 (1912), pp. 244–246*).—After discussing what the young city or village high-school graduate can do toward teaching agriculture to country boys and girls the author offers the following suggestions:

(1) Have an exhibit of the work done at least every 2 weeks to which the patrons are invited. Use the best of these exhibits for a general school exhibit of the township or village, and send the best of the township exhibits to the county fair exhibit. Garden products, soils, grains, fruits, harmful insects, seeds of all kinds, flowers, and plans for the garden or farm fields are stated to make excellent exhibits. (2) Organize an agricultural club in the school and invite into it all the young people of the vicinity. (3) Besides observation

trips, lessons on birds, seed testing, and weed seed studies, give attention to home sanitation.

Farm boys and girls, W. A. McKeever (*New York, 1912, pp. XVIII+326, pls. 32*).—This book belongs to the Rural Science Series, edited by L. H. Bailey, and was prepared both for the rural parents and the many persons who are interested in carrying forward the rural work discussed in the several chapters.

The first 2 chapters constitute an outline of some of the fundamental principles of child development. Among the subjects subsequently discussed are the transformation of the rural school, the farm boy's choice of a vocation, the kind of schooling the country boy and girl should have, social training for farm boys and girls, and juvenile literature in the farm home. References are given at the close of the chapters suitable for more extended discussions.

The garden primer, Grace Tabor (*New York, 1911, rev. and enl. ed., pp. 164, pls. 30, figs. 6*).—This volume presents only the elementary priciples of gardening. Some of its features are the gardener's calendar for each month in the year, a spraying table covering both the orchard and garden, a detailed vegetable planting table, and tables giving particulars concerning plants for rocky, wet, shady, and dry, arid places, and the best annuals and perennials.

MISCELLANEOUS.

Twenty-fourth Annual Report of Indiana Station, 1911 (*Indiana Sta. Rpt. 1911, pp. 59*).—This contains the organization list, reports of the director and heads of departments, of which portions of those of the animal husbandman, dairy husbandman, and veterinarian are abstracted elsewhere in this issue, and the financial statement for the federal and miscellaneous funds for the fiscal year ended June 30, 1911, and for the state funds for the fiscal year ended September 30, 1911.

Thirty-fourth Annual Report of North Carolina Station, 1911 (*North Carolina Sta. Rpt. 1911, pp. 265, figs. 66*).—This contains the organization list, reports of the director and heads of departments, the experimental work of which is for the most part abstracted elsewhere in this issue, a financial statement for the fiscal year ended June 30, 1911, numerous special articles abstracted elsewhere in this issue, and reprints of Press Bulletins 22, Use of Lime on the Farm, and 23, How to Suppress House Flies, and of Bulletins 209–216, previously noted.

Work of the agricultural experiment station for 1910–11, W. Frear (*Pennsylvania Sta. Bul. 113, pp. 3–22*).—This is a brief summary of the principal lines of work of the Pennsylvania Station for the fiscal year ended June 30, 1911.

Index to legislative history of acts of Congress involving the United States Department of Agriculture, O. H. Gates (*U. S. Dept. Agr., Office Solicitor, Index to Acts Cong. Involving Dept. Agr., 1912, pp. 53*).—This index includes references to the *Congressional Record* and committee reports on legislative acts through the Sixty-first Congress, and the annual appropriation acts beginning with that for the fiscal year 1901. A detailed topical index is appended.

Monthly Bulletin of the Department Library, December, 1911, and January, 1912 (*U. S. Dept. Agr., Library Mo. Bul., 2 (1911), No. 12, pp. 341–366; 3 (1912), No. 1, pp. 3–32*).—These numbers contain data for December, 1911, and January, 1912, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

NOTES.

Missouri University.—In order to encourage the basket-willow industry in Missouri, the forestry department of the college of agriculture has established a willow holt on the university farm for the purpose of determining species best adapted to the climate of the State.

Under direction of the dairy department, the college of agriculture has arranged to rent to farmers of Missouri forms for the construction of reenforced concrete silos, and also to give such personal assistance in their use as is found necessary. The expense is borne by the farmers who receive the service.

Cornell University and Station.—The trustees have approved a recommendation from the faculty of the college of agriculture to grant hereafter the degree of bachelor of science instead of that of bachelor of science in agriculture at the completion of the four-year course in the college of agriculture.

Dr. B. M. Duggar, professor of plant physiology and plant physiologist, has been appointed professor of plant physiology and applied botany in Washington University, vice Dr. George T. Moore, whose acceptance of the directorship of the Missouri Botanic Garden has been previously noted.

Rhode Island College and Station.—The general assembly has made an appropriation of $75,000 for a new science building to accommodate the college departments of chemistry, botany, zoology, physics, and geology, and the station work in biology. Ground for the new building will be broken in the near future, and it is hoped to have it ready for occupancy on September 1, 1913. A three-story stone structure, 156 by 72 feet, is contemplated.

Tennessee University and Station.—The thirty-ninth annual session of the East Tennessee Farmers' Convention was held on the station farm May 21 to 23, with an attendance of over 2,000. The program was divided into 7 sections, viz, general farming, live stock, dairy, poultry, horticulture, home making, and boys' corn club.

A notable feature of the convention was the dedication of the new convention hall and live-stock pavilion, in which the larger sessions were held. The building is being erected on the farm through the cooperation of the convention and the station, and will cost when complete approximately $13,000. It is named the Oliver Perry Temple Hall, in honor of a founder of the association whose daughter has contributed liberally toward the building fund. The balance of the cost has been provided for by the members of the convention.

Texas Station.—A. K. Short, formerly of the Arkansas University, has been appointed superintendent of the Temple substation and has entered upon his duties. H. C. Holmes, formerly superintendent at Temple, has been transferred to College Station as superintendent of the new feeding and breeding department.

Washington College and Station.—W. T. McDonald has resigned as professor of animal husbandry in the college and animal husbandman in the station to become live-stock commissioner of British Columbia, the change taking effect July 1.

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